Exploring the Application of the Sounds of Intent Music-Developmental Framework for Children on the Autism Spectrum with Severe or Profound and Multiple Learning Difficulties in Relation to Piano Pedagogy

by

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Abstract

This mixed methods study explores the potential use of the piano as a medium to promote musical skills in children with autism spectrum condition (ASC) who have severe or profound and multiple learning difficulties. The thinking behind the research is underpinned by the Sounds of Intent (SoI) framework of musical development. The aims of the research are to develop and evaluate new approaches to piano pedagogy that are suitable for children with ASC from the earliest stage of musical development (Sounds of Intent, Level 2). The new approaches involve re-conceptualising the piano as a multisensory resource that can engage children with ASC in a number of different proto-musical and musical ways. The two major advantages of this re-conceptualisation are that with appropriate pedagogy: a) it promotes *inclusion* in music education, since all children, irrespective of their level of musical development, can engage with the same resource in different ways, and b) it fosters *progress* in musical development, since the single resource has immense flexibility in the way it can be used, from advancing an understanding of 'cause and effect' to permitting the creation and production of complex abstract narratives in sound over time. Fourteen children and young people with ASC participated in the research, drawn from two special schools in London that use SoI. Each participant took part in 13 music sessions with the researcher, who acted as the teacher, over the course of 6 months. Each session lasted 5–30 minutes, depending on the participant's interest and willingness to cooperate. The sessions were recorded using two video cameras. A mixed methods approach was applied whereby participants' levels of engagement with each strategy were measured quantitatively using a simple binary measure of 'on task' and 'off task' and then subject to detailed interpretative phenomenological analyses. The results revealed that the engagement of the children was affected by several factors: the

cognitive functioning of the children, their levels of interest in the sounds and music that the piano could produce, the teaching quality and their willingness to interact with the teacher. The most effective strategies were those that were aligned with children's levels of musical development, were adapted to their preferred learning styles, and were often multimodal in design (visual, auditory and kinaesthetic). The study shows that the piano can be used as a learning resource for children on the autism spectrum with severe or profound and multiple learning difficulties to promote the development of musical skills and abilities, and to foster wider learning and development.

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Chapter 1. Introduction

1.1 Motivation and rationale of this study

As a classical pianist by training, I have taught the piano for several years. I have worked with students of a range of ages and abilities and have constantly sought opportunities and new approaches to develop my teaching skills and knowledge. These motivations led me to focus my master's dissertation topic on current piano pedagogies for pre-schoolers in the UK. The dissertation was completed while reading for a Master's degree in Music at Trinity Laban Conservatoire of Music and Dance.

During my master's study, I taught the piano at a music school and was approached by a woman who had a daughter with autism, severe learning difficulties and limited verbal skills. She was keen for her daughter to learn the piano, but she could not find a teacher who was willing to work with her daughter in view of the challenges that it would involve. I was moved by her pleas, and I decided to instruct the student despite my lack of experience with teaching children with autism.

I studied literature and research on music and autism but found that it has largely focused on intervention and therapy for the treatment of autism symptoms or on skill-building in the areas of impairment. For example, a study by Finnigan and Star (2001) assessed the effectiveness of music interventions for improving social responsiveness, while Kim, Wigram and Gold (2009) examined the implications of music therapy for children with autism spectrum condition[1] (ASC). In addition, Lim (2010) investigated

[1] The term autism spectrum condition (ASC) proposed by Baron-Cohen (2009) will be used throughout the thesis. This term is favoured in relation over the term 'disorder', which is the most commonly used as it is the one used by the DSM. It is less stigmatising and reflects that these individuals do not only have disabilities which require a medical diagnosis, but also areas of cognitive strength. Moreover, a survey looking into the terms used to describe autism, the autism community highly endorsed terms such as 'autism' and 'on the autism spectrum', and to a lesser extent, 'autism spectrum disorder' (Kenny et al., 2015).

how music can serve as a tool to improve language and communication. With regard to music education for children with ASC, most activities and research topics have been situated in a classroom setting. The literature encompasses effective classroom tools for individuals with ASC, such as the use of visual aids and schedules (Clements-Cortes, 2012), as well as methods for music teachers who work with individuals or groups of students with ASC who are learning stringed instruments (Nelson, 2012).

When I began researching piano pedagogy that is applicable for teaching children with ASC, I found no available method to guide me as a piano teacher. Contemporary piano pedagogies provide children with basic knowledge of the instrument, such as the names of the keys, hand positions and techniques, and the approach to reading letter notations and subsequently transferring them to stave notation in order to learn to play a repertoire. Because these skill-building processes present children with a large amount of information at once, they are unsuitable for teaching children with ASC who have learning difficulties. Children with ASC and learning difficulties struggle not only in reading but also in comprehending instructions for playing the piano. I eventually concluded that there is a serious gap in the field of piano pedagogy for children with ASC.

Over the past few decades, research on piano teaching has surged (Burwell, 2013; Fisher, 2010; Gaunt, 2010). Predominant research areas have been technique, notation and repertoire in lessons (Gibbs, 1993; Odam, 1995), and most studies have targeted neurotypical children. However, there has also been interest in piano pedagogy for pre-school children (Cathcart, 2013; Thomas-Lee, 2003), and research has explored various piano methods for teaching children who are in the early stages of musical development. However, none of the theories has been suitable for teaching children with ASC and learning difficulties.

Research has addressed the benefits of music for individuals with ASC, but studies have mostly focused on uses of music as an intervention or therapeutic tool for treating the symptoms of ASC. For example, Whipple (2004) reviewed nine studies that compared music to non-music interventions for children with ASC and discovered that music can be beneficial irrespective of the age of the participants in the following area: social behaviours, attention to task, communication and engagement with others, body awareness and coordination, symbolic play and anxiety reduction. Accordingly, it has devoted less attention to effective music instruction and opportunities for musical enjoyment for this group. There is limited literature on how these individuals – who may exhibit musical strengths – can be taught effectively.

Despite the lack of formal research, anecdotal reports have demonstrated the capacity of music to provide an avenue to fulfilment for individuals with ASC (Ockelford, 2007; 2010; 2018; Schott, 2016; Ter Bogt, et al., 2009). Ter Bogt et al. (2009) conducted a study of a 40-year-old woman who was diagnosed with ASC at the age of three. The woman was on the severe, low-functioning end of the spectrum and exhibited muteness, poor social interactions, rigidity, and abnormal motor movements and vocalisations. The authors cited studies that described high-functioning individuals with ASC who demonstrate distinct and creative musical abilities but found a lack of studies on lower-functioning individuals. Despite receiving no formal training, the subject of the study displayed significant musical abilities by the age of three and composed her own pieces on the piano, which she continued to do into adulthood. According to the authors, the compositions contain little variation but do involve elements of creativity and complexity, and the woman played only her own compositions. There were also indicators of non-verbal communicative engagement when she played.

In 2009, Adam Ockelford published *In the Key of Genius*, which discusses his work with Derek Paravicini. Ockelford is a professor of music who has many years of experience in instructing children with visual impairments and children with autism and severe learning difficulties. Although Derek is blind, has severe autism and learning difficulties, and cannot differentiate between his right and left hand, he is a renowned pianist. Treffert (2009) has referred to Derek as a 'musical savant', as he possesses extraordinary musical abilities that include absolute pitch and advanced memory skills. Despite his condition, Derek has been able to transform his life with music. In a recent article, Ockelford (2018) discussed other children with ASC and severe learning difficulties who were fascinated and motivated by music and who often demonstrated instrumental skill on the piano. Ockelford (2013) had previously opined that the piano is often the first choice of instrument for children with ASC – particularly those with absolute pitch – because it offers immediacy and consistency in sound. These qualities appeal to such children, as they seek regularity, simplicity and consistency. Given these examples, it is apparent that music-making – and playing the piano in particular – is a powerful element which can have a positive impact on children with ASC.

Advances in neuroscience and recent extensive research on the brain have also referenced music and its potential benefits for children with ASC, especially with regard to communication development, interaction and expression (Wan, Demaine, Zipse, Norton & Schlaug, 2010). The literature describes an overlap between the language and music systems in the brain and suggests that involvement in music-making through singing or playing an instrument can engage this language system in the brain (Wan et al., 2010). The approach that teachers employ is a crucial component of using the piano effectively as a resource for development.

There is a need for a methodology that piano teachers can follow systematically when teaching children with ASC who have severe learning difficulties. Despite the growth in piano pedagogy research in the last two decades, no studies have explored how to teach children on the autism spectrum. This serious lacuna in piano pedagogy highlights the need for a scheme that can enable piano teachers or music practitioners to work with children with ASC who have severe learning difficulties. This need has ultimately led me to conduct this study.

1.2 Statement of aims

The study uses the Sounds of Intent (SoI) framework, which is the only existing framework that systematically maps the musical development of children and young people with ASC. It covers the whole range of ability, extending from profound and multiple learning difficulties (PMLD) to those with high-functioning autism who do or may not display exceptional musical abilities. The framework provides a range of supportive resources for teachers and educators for promoting the musical development of such children.

However, there is a gap in the materials that have accrued to the SoI framework, as no research has explored the use of instruments on each music-developmental level. By researching the effectiveness of using the piano, the present study contributes to filling that gap. Further studies in this area can yield suitable pedagogical approaches and illustrate that it is possible, with the appropriate support, to develop musical performance skills in these children. With this possibility in mind, this study seeks to develop approaches to using the piano and subsequently test their capacity to stimulate learning among children with ASC who have severe learning difficulties.

1.3 Research objectives

The objectives of the research are as follows:

1. To investigate the use of the piano as a medium for engaging with children with ASC who have learning difficulties through music as well as to promote musical skill.
2. To develop a number of pedagogical strategies that may be appropriate for children at each level of musical developmental.
3. To assess, through the use of external examiners, which strategies are the most effective for each level of musical development.

1.4 Hypotheses and research questions

The hypotheses for this research are as follows:

1. Music teachers can utilise the piano as a multisensory tool to promote the musical skill of children with ASC who are in the early stages of musical development.
2. Effective strategies can enhance a child's musical development.

The study considers the following research questions:

1. Can the piano be used as a medium to promote musical skill when engaging with children with ASC who have learning difficulties?
2. Which strategies are appropriate for children at each musical -development levels?

1.5 Overview of the thesis

This thesis contains eight chapters. Following this introduction, **Chapter 2** sets out a range of definitions and descriptors of autism. It also provides an account of the behavioural and cognitive perspectives of autism. To consider the effect of

behavioural indications on individuals with ASC, the chapter discusses relevant pedagogical approaches that are available in the UK to mitigate the impact of autism. It additionally addresses the relationship between music therapy and music education and the contribution of this study to the latter field. The literature review justifies the choice of the piano and illustrates the unsuitability of existing piano pedagogies for teaching children with ASC who have learning difficulties. It also examines the SoI framework, which is the only existing framework for children and young people with learning difficulties.

Chapter 3 presents the methodology. To this end, it reviews the choice of a case study as a suitable research methodology as well as the use of video. It also details the mixed methods approach that was applied for the data collection and analysis. Subsequently, the chapter addresses ethical considerations of this research, such as obtaining consent to participate and the need to navigate additional considerations when conducting a study that involves children with communication difficulties. Finally, the chapter discusses reliability and credibility issues.

The results are presented in four chapters. **Chapter 4** reviews the outcome of the strategies on SoI Level 2 participants, while **Chapter 5**, **Chapter 6** and **Chapter 7** assess such outcomes for participants at Level 3, Level 4 and Level 5, respectively. These chapters also present the findings from the statistical analysis and the qualitative data. To establish factors that affect participant engagement, behaviours were interpreted according to cognitive autism theories, learning modalities of children with ASC, early-years musical development theories and the teacher's reflective thought process.

Chapter 8 discusses the research questions in relation to the literature review and the

implications of the findings of this study in relation to piano pedagogy. Moreover, it highlights the significance of the study and describes its contribution to knowledge. The chapter concludes by acknowledging the limitations of the study and offering suggestions for further research.

Chapter 2. Literature Review

2.1 Introduction

This chapter provides background knowledge and essential context for autism. In addition, it delivers an account of the behavioural and cognitive perspectives of the condition. Research on the impact of behavioural indications on individuals with ASC has developed various treatments, coping strategies and therapeutic interventions to alleviate, decrease or manage the symptoms.

2.2 What is Autism?

Autism spectrum condition is a range of lifelong neurological conditions that usually manifest within the first two or three years of life (Boucher, 2009; Frith, 2013; Happé, 1999; Wing, 2005). It is characterised by impairments in social interaction and communication as well as restricted, repetitive stereotyped behaviours, interests and activities (American Psychiatric Association [APA], 2013). Individuals with ASC vary in terms of their language ability, which can range from absent speech to fluent language, as well as in their cognitive development, which can vary between profound intellectual disability and above-average intellectual functioning. In addition, individuals may also exhibit medical comorbidities, including epilepsy and minor physical anomalies, and psychiatric comorbidities. such as attention deficit and hyperactivity disorder (ADHD), anxiety disorders and mood alterations. These individuals display wide clinical heterogeneity (Maski, Jeste & Spence, 2011).

The term ‘autism’ was first defined by Leo Kanner in 1943. In this year, Kanner discovered conditions in 11 cases which he felt bore a sufficient number of similarities. Such conditions included language delay, social remoteness, obsession with similarity, excellent rote memory, oversensitivity to stimuli and delayed echolalia (Kanner, 1943; Tchaconas & Adesman, 2013). He coined the term ‘infantile autism’ (Fein et al., 2013;

Naviaux et al., 2014). In 1944, Hans Asperger described a syndrome that is now known as Asperger syndrome (AS), which presents similar characteristics to autism, such as poor eye contact, resistance to change and narrowed special interests. However, these children did not exhibit significant challenges with language and communication and experienced no delays in language during early development (Reichow, 2012; Tchaconas & Adesman, 2013).

In 1979, Wing and Gould identified a larger group of children who suffered from impairments in social interaction, communication and imagination – the so-called 'triad of impairments' – as well as a repetitive, stereotyped pattern of activities (Wing & Gould, 1979). Thus, Wing (1989) introduced the term 'autism spectrum' to capture a broader description of this condition.

In May 2013, the American Psychiatric Association (APA) published the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), which reflected significant changes to the criteria for diagnosing ASC-related conditions. Two notable changes were the removal of the separate pervasive developmental disorders (PDDs) as well as the elimination of AS, both of which were replaced by a single ASC diagnosis (Doernberg & Hollander, 2016). A second significant change in autism diagnosis was the reduction of the 'triad of impairments' to a dyad. The justification was that it is arbitrary to distinguish between social and communication domains since these two areas are combined. The new system of ASC classification establishes social and communication as the first domain and repetitive and restrictive behaviours as the second (APA, 2013). Such changes aim to improve the specificity and sensitivity of autism diagnosis to achieve more accurate descriptions and communication regarding developmental disorders as well as to serve as a more useful and productive backdrop for treatment planning (Eapen & Črnčec, 2014).

2.3 Prevalence

The prevalence of ASC diagnosis is increasing, which is most likely to heightened public awareness (Maenner et al., 2014), easy availability of healthcare professionals (Idring et al., 2015) and modifications to the diagnostic practices (Zablotsky, Black, Maenner, Schieve & Blumberg, 2015).

Rogers, Goddard, Hill, Henry & Crane (2016) have found that approximately 500,000 individuals out of the total UK population have been diagnosed with autism. According to the Centres for Disease Control and Prevention (CDC, 2017), 1 in 68 children in the US has been diagnosed. Furthermore, the World Health Organisation (WHO, 2017) has reported that ASC affects approximately 1 in 160 children worldwide. These statistics indicate that ASC is not specific to any ethnic, racial or socioeconomic group.

However, boys are five and a half times more likely than girls to have ASC (Christensen et al., 2016). However, recent large-scale, population-based epidemiological studies that involve active case ascertainment[2] have challenged this statistic by demonstrating a male preponderance ratio of between 2:1 and 3:1 (Jensen, Steinhausen & Lauritsen, 2014; Baxter et al., 2015; Lai, Lombardo, Auyeung, Chakrabarti & Baron-Cohen, 2015). A major hypothesis concerning this difference references the influence of foetal testosterone, which maintains and systemises human behaviour and could thus lead to a higher prevalence among males. However, some researchers have argued that autism is under-diagnosed in females (Gould & Ashton-Smith, 2011; Gould, 2017). Gould and Ashton-Smith (2011) have also identified

[2] Active case ascertainment involves screening a population-based sample in an attempt to identify all cases regardless of whether they have already come to clinical attention. Such method will yield more valid estimates of the male-to-female ratio, as they are more likely to identify individuals with ASC, even if they have missed by the services (Loomes, Hull and Mandy, 2017).

various ways in which females present in terms of social understanding, social communication and social imagination, which are highly associated with routines, rituals and special interests.

Fortunately, studies have started to include more female participants and merge multisite data, so autism research has improved its representation of females (Watkins, Zimmermann & Poling, 2014). This improvement contributes statistical power to address a variety of empirical and theoretical questions about the relationships between sex or gender and autism (Lai et al., 2015).

2.4 Behaviour

Autism has been ascribed substantial genetic aetiologies (Abrahams & Geschwind, 2008; Geschwind & State, 2015; Sanders et al., 2015; Lombardo et al., 2016) and certain environmental, genetic and biological risk factors (Modabbernia, Velthorst & Reichenberg, 2017; Bolkan & Jordan, 2016; Sealey et al., 2016), such as the following: immediate family with ASC or another genetic or chromosomal disorder; prenatal intake of certain prescription medications, such as valproic acid or thalidomide, by the mother; low birth-weight; and premature birth (Kaplan, Keskin-Arshan, Acar & Sozmen, 2016).

Brain studies (Brambilla et al., 2003; O'Reilly, Lewis & Elsabbagh, 2017; Friston, 2011; Sporns, 2013) have revealed that several neural systems are structured and function atypically in ASC. Despite the variability in clinical presentation, autism is diagnosed on the basis of observed behaviours that reflect the dyad of impairments: a) deficits in social communication and social interaction and b) restricted, repetitive patterns of behaviour, interests and activities at different levels of severity. Table 1 displays the main characteristics, while Table 2 addresses the severity levels. Both tables are adapted from the DSM-V (APA, 2013).

Table 1. The set of diagnostic criteria (adapted from APA, 2013, p.50)

A. Persistent deficits in social communications and social interaction across multiple contexts, as manifested by the following, currently or historically (examples are not exhaustive:
   1. Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation to reduced sharing of interests, emotions, or affection to failure to initiate or respond to social interactions
   2. Deficits in nonverbal communicative behaviours used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication to abnormalities in eye contact and body language or deficits in understanding and use of gestures to a total lack of facial expressions and nonverbal communication
   3. Deficits in developing, maintaining, and understanding relationships, ranging, for example, from difficulties adjusting behaviour to suit various social contexts to difficulties in sharing imaginative play or in making friends to an absence of interest in peers

B. Restricted, repetitive patterns of behaviour, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):
1. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases)
2. Insistence on sameness, inflexible adherence to routines, or ritualised patterns of verbal or nonverbal behaviour (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take the same route or eat the same food every day)
3. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests)
4. Hyper- or hypo-activity to sensory input or unusual interest in sensory aspects of the environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement)

Table 2. Severity levels for ASC (adapted from APA, 2013, p.52)

Severity level	Social communication	Restricted, repetitive behaviours
Level 3 'Requiring very substantial support'	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions and minimal response to social overtures from others. One example is a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches.	Inflexibility of behaviour; extreme difficulty coping with change; or other restricted/repetitive behaviours that markedly interfere with functioning in all spheres; immense distress/difficulty in changing focus or action
Level 2 'Requiring substantial support'	Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. An example is a person who speaks simple sentences, whose interaction is limited to narrow special interests and who has markedly odd nonverbal communication.	Inflexibility of behaviour; difficulty coping with change; other restricted/repetitive behaviours appearing frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts; distress and/or difficulty in changing focus or action
Level 1 'Requiring support'	Without supports in place, deficits in social communication cause noticeable impairments; difficulty initiating social interactions and clear examples of atypical or unsuccessful responses to social overtures of others; may appear to have decreased interest in social interactions. An example is a person who is able to speak in full sentences and engages in communication but fails in to-and-fro conversation with others and both acts oddly and is typically unsuccessful in attempting to make friends.	Inflexibility of behaviour causes significant interference with functioning in one or more contexts; difficulty switching between activities; problems with organisation and planning hamper independence

2.5 Autism Theories

This section examines and evaluates autism from the cognitive perspective, which contributes to the psychological description of core impairments in individuals. Various psychological models of autism have been developed over the past two decades to account for the observed social deficits or delays (Miller & Saygin, 2013). The development of these models has advanced understandings of the learning style of individuals with ASC. These insights have in turn supported the establishment of

teaching practices that address their learning needs. The cognitive level encompasses work on the mind, feelings and thoughts of an individual with autism. The four dominant cognitive models of autism are theory of mind (ToM) (Baron-Cohen, 2002; Baron-Cohen, Tager-Glusberg & Lombardo, 2013; Jones et al., 2018), weak central coherence (WCC) (Frith, 1989; Happé & Frith, 2006), executive dysfunction (Hill, 2004; Jones et al., 2018) and sensory processing (Bogdashina, 2016).

2.5.1 The Theory of Mind (ToM)

The ToM is one of the most influential autism theories (Simmons et al., 2009). It postulates that individuals with autism have 'mind blindness', which causes difficulty with inferring the mental states of others (Chevallier, 2013) and is commonly assessed through a 'false belief' task (Wimmer & Perner, 1983; Murray et al., 2017; Mahy, Bernstein & Gerrard, 2017). The results of one study suggest that 90% of neurotypical children were able to complete a task, whereas none of the children with autism was successful. The author of the study, Baron-Cohen (1995) has concluded that individuals with autism did not have a full representational ToM and therefore failed the task.

The ToM is associated with the ability to empathise with and develop an understanding of the social and communicative difficulties that individuals with ASC experience. This theory is supported by the extreme male brain (EMB) theory (Baron-Cohen, 2002), which derives from the finding that men are generally better systemisers than women, while women display superiority in empathising (Manson & Winterbottom, 2012). Baron-Cohen (2002) has argued that individuals with ASC are generally skilled at systemising but poor at empathising. His research demonstrates a neurobiological basis to support these differences in cognitive styles and brain types. Measurements of amniotic fluid during the second trimester of pregnancy have

revealed increased foetal testosterone in those with higher autistic traits or autism (Auyeung et al., 2009; Baron-Cohen et al., 2011). Recent research has associated elevated systemising in males with larger hypothalamic and ventral basal ganglia regions in the brain (Lai et al., 2012). Moreover, females with ASC appear to differ from neurotypical females mainly in brain regions that differ between typical males and females, which supports the EMB theory, at least for females. The ToM provides a framework to more accurately understand musical phenomena, as it permits various interpretations of music-related constructs in terms of levels of empathising and systemising, which can illuminate underlying psychological processes that are involved in the musical experience. The resulting insights can clarify how music can increase empathy and may have direct implications for the study of autism.

Individuals with ASC often struggle to feel connected to people and the social environment that surrounds them, which may lead to feelings of isolation, frustration and confusion. Such individuals have a weak interpretation of the experiences of characters in a story and therefore find it difficult to imagine it. However, exploration of the ToM has been limited, as tests have been applied only to individuals who speak and understand language (Trevarthen, 2002). Therefore, their results do not explain problems with joint attention[3] and mutual attention among two-year-old children, whose age is excluded from the ToM (Mundy, 2016; Delafield-Butt & Trevarthen, 2017).

Children with ASC also have difficulties with imaging the form of their bodies as well as with the coordination of their body movements (Trevarthen & Panksepp, 2016; Varela, Thompson & Rosch, 2017). Some may exhibit signs of not recognising parts

[3] Joint attention involves two participants actively sharing attention towards an object or event and monitoring each other's attention towards that object or event (Bruner, 1975; Jones & Carr, 2004).

of their bodies as belonging to themselves, which is compatible with the ideas of a core function of 'embodiment' or 'somatic marking' that underlie the functional coherence and dynamic coordination of the mind (Varela et al., 2017). This lack of recognition may cause the deficit in social interaction of individuals with ASC, as bodily and expressive movements mediate all intersubjective contact between human beings (Trevarthen & Panksepp, 2016).

While generation of purposeful movement and systematically deployed awareness appears to be the fundamental problem, music can address these problems of moving, sensing and feeling (Trevathern, 2002). Music engages the central coordination of body movement by mimicking its dynamics (Aldridge, 1996; Nordoff and Robbins, 1968, 1977; Trevarthern, 2002). By using music as a medium, it is effective in gaining therapeutic access to the esoteric motives of these children with ASC. Music can be used to complement, reinforce, give continuity to or modulate emotions that perhaps arise from the confusion of initiatives and inadequate monitoring of the experiences of moving (Trevarthern, 2002). A musical response is possible even for a child who has severe physical, intellectual or emotional disability and therefore music can promote intimate relationship of affection and trust and developing communication. It is particularly useful when verbal communication is severely reduced or impossible.

2.5.2 Weak Central Coherence Theory (WCC)

Weak central coherence (WCC) theory proposes that individuals with autism possess a specific cognitive style that impedes the integration of information to formulate a global perspective (Frith, 1989; Happé & Frith, 2006). Individuals with autism display a processing style which attends to details rather than the overview, which partly explains why they have accomplished superior performance in projects that involve embedded figures (Happé, 2015) and visual tasks (Van der Hallen, Evers, Brewaevs,

Van den Noortgate & Wagemans, 2015). Further support for WCC derives from the observation that an unusually high proportion of individuals with ASC demonstrate 'savantism', whereby they exhibit extraordinary skills in certain areas (Howlin, Goode, Hutton & Rutter, 2009). This theory is relevant to access to musical processing in children on the autism spectrum.

According to Ockelford (2013), Grandin (1992) and Bogdasina (2003), the capacity to 'hear sounds in our heads' is a relatively common feature among children on the spectrum, especially those who possess absolute pitch.[4] This ability could arguably be linked to weak central coherence, which imparts a tendency to focus attention on parts rather than the whole. Still, Ockelford (2015) has indicated that musical savants and certain children with autism are able to process chords (clusters of notes), and such musical processing diverges from the general principle of weak central coherence, which posits that the autistic mind is attracted primarily to surface-level details. Ockelford has ascribed this phenomenon to the exceptional early cognitive environment (EECE) produced by autism.

2.5.3 Executive Dysfunction Theory

The executive dysfunction theory is a collective term for four main types of cognitive capacity, namely planning, mental flexibility, inhibition and generativity (Russell, 1997; Hill, 2004; Gray, Young & Waytz, 2012). Neuroscientists have often employed executive function (EF) as an umbrella term for a vast network of cognitive and behavioural skills and processes that are necessary to plan, initiate and perform activities. The theory proposes that the core cognitive symptoms that individuals with ASC display are a result of improper performance by the EF system, which facilitates

[4] Absolute pitch (AP) is the skill or an ability to identify or recreate a given musical stimulus without the benefit of a reference tone (Deutsch, 2013; Ward, 1998).

tasks such as working memory (WM), planning and attention (Varela et al., 2017). Proponents of this theory have suggested that impairments in such capacities predispose an individual to engage in repetitive behaviours and rigid routines as well as pursue narrow interests.

One area of EF which is frequently discussed in relation to ASC is WM. Pennington and Ozonoff (1996) have argued that WM is a component of EF in view of its function in the organisational aspects of memory and its role in goal-directed behaviour which helps by guiding, preserving and updating attention to goal-directed processes and information. Working memory refers to the ability to simultaneously store and process information. Previous studies have found evidence of WM deficits in individuals with ASC across a wide range of chronological and mental ages (Geurts, Verté, Oosterlaan, Roeyers & Sergeant, 2004; Ozonoff, 1997; Verte, Geurts, Roeyers, Oosterlaan & Seargeant, 2006). As a notable strength of this Executive Dysfunction theory, it explains certain non-social symptoms that the ToM and WCC do not cover, such as attention-switching problems and reduced impulse inhibition (Varela et al., 2017). Music perception literature that examines children with executive dysfunction has recently become available (Huss, Verney, Fosker, Mead & Goswami, 2011; Thaut, McIntosh & Hoemberg, 2015) and proposed that music lessons could enhance EFs and selective attention and inhibition in particular (Degé, Kubicek & Schwarzer, 2011; Lesiuk, 2015). Music learning requires memory and attention skills as well as development of implicit knowledge of acoustic and syntactic rules that bind musical sounds (Kraus & Chandrasekaran, 2010; Strait, Kraus, Parbery-Clark & Ashley, 2010). This project considers the learning of the piano, which requires the simultaneous use of several brain functions by involving memorisation as well as the recognition and physical execution of sounds through the sensory integration of inputs from

proprioception, vision and hearing. In this way, it is possible that learning the piano may stimulate wider learning and development of children with ASC.

2.5.4 Sensory processing

The diagnostic criteria for ASC in the most recent publication of the DSM-V now include difficulties in sensory processing. According to this sensory processing theory, individuals with ASC exhibit impairments in one or more of their senses. Early clinical accounts have documented that individuals with ASC displayed increased response to sensory stimulation and heightened apprehension when reacting to external stimuli (Kanner, 1943; Asperger & Frith, 1991). These responses to sensory stimulation included over-responsiveness to sensory stimuli and difficulties in modulating sensory inputs (hypersensitivity) as well as under-responsiveness to stimuli (hyposensitivity) (Ben-Sasson et al., 2009; Bogdashina, 2016).

Robledo, Donellan & Strandt-Conroy (2012) have interviewed individuals with ASC to gain insight into their sensory idiosyncracies. Their study considered three senses: auditory, visual and tactile. Many participants described unusual auditory differences; for example, certain sounds could provoke physical pain and anxiety. Moreover, some participants reported several visual differences, such as unique interaction with colours or varied responses to lighting and pain caused by visual stimuli, while others experienced unusual sensations in relation to different surfaces, such as fabric or sweat. These results correspond with literature that has often associated individuals with ASC with an auditory processing disorder, visual perceptual dysfunction and tactile defensiveness. For instance, Delacato (1974) and Grandin (2006) have identified hypersensitivity in the auditory process, while Ornitz (1974) has implied that some individuals with ASC may be unable to modulate certain sounds. Furthermore, Condon (1975) and Rimland (1964) have suggested that individuals with ASC exhibit

delays in auditory processing, while Meares (1980) has reported distortions of print when reading. Williams (1998) has described his own experience of fragmented perception when viewing a crowd, and Higashida (2013) has outlined a personal visual experience wherein vivid colours or shapes attracted his attention first and rendered him unable to concentrate on any other aspects. Sensory processing obstacles can affect how individuals with ASC engage in learning tasks. Since they struggle to link incoming data from various sensory modalities, they find it difficult to filter and accommodate sensory stimuli in order to develop an adaptive response (Tomcheck & Dunn, 2007).

2.5.5 Joint attention

In typically developing children, joint attention skills first present around six months of age and continue to advance throughout the first two years of life (Mundy & Thorp, 2007). Joint attention behaviours involve two skills, namely responding to and initiating joint attention. With the former, an individual can follow a person's eye gaze, gestures and head motions in order to share an object or experience, whereas the latter requires the use of eye contact or gestures to initiate the sharing of an experience or object with another person. A deficit in joint attention is one of the core impairments of children with ASC (Baron-Cohen, Allen & Gillberg, 1992; Charman et al., 1998), who encounter more difficulty than their peers when performing skills that involve joint attention (Charman et al., 1998; Carpenter, Pennington & Rogers, 2002). Cognitive autism theories explain the deficits in joint attention among individuals with ASC. Baron-Cohen (2009) have clarified that it is the inability to empathise (as dictated by the ToM) that precludes an individual with ASC from following another individual's gaze to share an object or experience. This inability in turn accounts for their lack of joint attention skills. According to WCC theory, joint attention deficits

are due to an inability to integrate all stimuli that are involved in the processing of shifts in a person's gaze into a whole unit.

Joint attention behaviours have been observed more often in children with ASC in the presence of musical stimuli (LaGasse, 2014; Kim et al., 2009; Yoo, 2010). Kim et al. (2009) have conducted a study that employed music therapy to improve the social skills of children with ASC. The researchers compared the effects of improvisational music therapy versus toy play in improving emotional, motivational and social responses among 10 children with ASC between the ages of three and five. The results highlight a significant difference between the impacts of improvisational music therapy and toy play sessions. Specifically, music therapy produced more and longer 'joy, emotional synchronicity and initiation of engagement' behaviours in the children. The authors have offered their findings as a foundation for further exploration of musical attunement to improve the social development of children with autism.

Kalas (2012) has examined the effect of simple versus complex music in facilitating joint attention among 30 children, of whom 15 were diagnosed with severe ASC and 15 with mild to moderate ASC. According to the findings, for children in the severe range, it is more effective to use simple music with clear, predictable patterns to elicit responses to bids for joint attention. In contrast, music that is more complex and variable was seemingly the most effective to elicit such responses from children in the mild to moderate range. These results indicate that careful manipulation of specific musical elements may gave the capacity to support optimal conditions for facilitating joint attention among children with ASC.

Yoo (2010) has utilised musical cues in therapy and found significantly increased responses to joint attention among children with ASC. In addition, LaGasse (2014)

has measured nonverbal communication outcomes in terms of eye gaze and joint attention. In this randomised control music therapy study, 17 children with ASC received a twice-weekly, 50-minute neurologic music therapy session. The session included movement to music, instrument playing and music-accompanied sensory stimulation with the aim of promoting social experiences, such as eye gaze, communication and joint attention. The results demonstrate significant positive effects of music therapy in increasing the nonverbal communication elements of eye gaze and joint attention.

These studies appear to support the use of music as an intervention to improve joint attention among children with ASC (LaGasse, 2014) and imply that children with ASC perform better in terms of joint attention when engaging in musical activities (Kim et al, 2009). Although the present study does not measure the joint attention of children with ASC, the benefits of using music to foster joint attention skills among such children are apparent.

2.6 Current Focus on autism research

As stated earlier, the prevalence of ASC diagnosis is increasing. This has led to a significant rise in autism research, giving rise to a better understanding of autism and evidence-based practice. In the US, US$950 million is authorised by the Combating Autism Act (2006) to autism research for states to develop autism screening, early diagnosis and intervention programmes for children (Insel and Daniels, 2011; Singh, Illles, Lazzeroni & Hallmayer, 2009). In UK, public and private funding organisations invested almost £21 million into autism research between 2007 and 2011 (Pellicano, Dinsmore & Charman, 2013). The fundamental aim of the surge in investment in autism research is to help in improving the life chances of individuals with ASC and their families (Insel and Daniels, 2011). However, such aims can only be achieved if

research is directed towards those areas where it is most needed and can make the most impact. Pellicano and her colleagues (2013) have conducted a survey on the current funding landscape in the UK. The analysis showed that projects in the area of biology, brain and cognition far outstripped all other areas of autism research with only 5% of funding directed towards identifying effective services for individuals with ASC and their families. In 2014, Pellicano, Dinsmore and Charman conducted another survey on the community views and priorities of autism research focus in the UK. The findings suggested that the current UK autism research is heavily biased towards basic science research such as genetics and biological aspects of autism which the members of the UK autism community are generally dissatisfied as there are more immediate concerns that need to be identified such as interventions for practical, social and emotional issues as a higher priority. The results indicate that there is a clear mismatch between what is being researched and the research that is preferred and prioritised by the autism community. The Interagency Autism Coordinating Committee (IACC) (2017) has called for a paradigm shift in autism-related research. The research should include those that have a more immediate and direct impact on the daily lives of individuals of ASC and their families. This revised approach to autism has acknowledged the need to address the everyday realities of autism. The current study fits into such category as it looks into how music can be used as a tool in helping to improve the lives of children with ASC. The study develops strategies in teaching the piano to individuals with ASC not only for the benefits of their well-being but also to recognise and foster their strengths.

2.7 Autism intervention

The differences that individuals with ASC display affect vital aspects of a person's quality of life, including his or her interactions with other people, communication of

ideas and feelings, and understanding of the thoughts or feelings of others (Mandell et al., 2013). While there is no cure for the condition, several interventions have emerged to mediate its impact. According to Odom, Boyd, Hall & Hume (2014), schools and educators in the UK currently apply three autism pedagogy approaches: treatment and education of autistic and related communication handicapped children (TEACCH), the picture exchange communication system (PECS) or applied behaviour analysis (ABA).

2.7.1 Treatment and Education of Autistic and Related Communication Handicapped Chilren (TEACCH)

The TEACCH concept describes ASC as the 'culture of autism' and conveys that, like a culture, ASC yields characteristic patterns in thought, communication, worldview and behaviour (Mesibov, Shea & McCaskill, 2012; Mesibov, Howley & Naftel, 2015). The learning style and information-processing characteristics that comprise the 'culture of autism' include visual learners (Mesibov et al., 2015; Ganz, Simpson & Lund, 2012), narrowly focused attention and WCC (Frith, 1989; Happé, 1997); EF (Lopez, Lincoln, Ozonoff & Lai 2005; Ozonoff, 1997) and sensitive sensory perception and responses (Kern, Trivedi, Garver, Grannemann & Andrews, 2006; Tomchek & Dunn, 2007).

As its primary intervention and educational strategy, the TEACCH model adapts structured teaching, which incorporates the cognitive social learning theory perspective. This perspective emphasises the role of internal determinants of behaviour as well as the utility of external rewards and negative reinforcement (Mesibov et al., 2004; Mesibov et al., 2015). It involves a highly individualised assessment process (PEP-3; T-TAP), which identifies the strength of each individual (Mesibov, Thomas, Chapman & Schopler, 2007; Mesibov et al., 2015). Structured

teaching centres on the use of visual and organisational supports in a variety of settings, such as the home and the classroom. The concept has four components: physical structure, visual schedule, work and activity systems, and visually-structured activities (Hampshire & Hourcade, 2014; Knight, Sartini & Spriggs, 2015). Unlike other interventions, TEACCH recognises the effectiveness of intervention with the involvement of families; accordingly, TEACCH professionals collaborate closely with the families of children who are affected by ASC. According to an evaluation of the social validation of ABA and TEACCH, there was a general tendency towards applying the TEACHH method among educators who instructed a mixture of students that included students with autism (Odom et al., 2014). However, the scholars who conducted the evaluation concluded that most consumers preferred to use a combination of interventions. Odom et al. (2014) have theorised that receiving a low rating does not confirm that a model is ineffective; rather, the rating is due to the fact that procedures and models have not been published for external review. The effectiveness of a model is evident from various positive results that studies generate in addition to feedback from schools and parents.

2.7.2 Picture Exchange Communication Systems (PECS)

Communication is a fundamental aspect of life, but individuals who are diagnosed with ASC have to contend with significant challenges in this regard (APA, 2013). It is estimated that one-third to one-half of children and adults with autism do not use speech functionally (Neeley, Pulliam, Catt & McDaniel, 2015). Therefore, to assist children with ASC in expressing their needs, desires, feelings and preferences in a way that others can understand, the augmentative and alternative communication (AAC) system was introduced (Bondy & Frost, 1994; Ganz et al., 2012; Bondy, 2012). The PECS was initially developed in the USA by Bondy and Frost. The system targets

children with ASC who have limited or no functional communication and helps them learn language and social interaction skills (Bondy, 2012; Ganz et al., 2012). The aim is to teach spontaneous communicative skills within a social context through the use of symbols or pictures. The approach of the PECS relies on basic behavioural principles and particularly emphasises reinforcement and prompting techniques. Children are taught to exchange with a communicative partner by exchanging a picture of their desired item for the preferred item itself. The act is reinforced by a definite outcome, namely receiving the desired item.

Unlike many traditional language programmes, which often teach 'labelling' as the first communicative skill, the PECS first teaches 'requesting' (Bondy, 2012; Kagohara, Sigafoos, Achmadi, O'Reilly & Lancioni, 2012). In relation to other AAC systems and approaches to teaching language to children with ASC, studies have identified numerous disadvantages which often result in prompt-dependent and non-spontaneous speech (Schreibman et al., 2015; Ganz et al., 2012). In contrast, the PECS relies on child-initiated communication and systematic physical prompts to minimise prompt dependence. Moreover, many traditional language programmes often require children to attain certain prerequisite skills, such as attending (eye contact) and motor and imitation skills, to learn functional language (Bondy 2012; Kagohara et al., 2012; Ganz et al., 2012). However, the PECS does not require children to have such skills.

The programme is structured in six phases that range from learning to exchange a picture in order to request a desired item to forming sentences, answering questions and commenting (Bondy, 2012). Although the programme was initially established for preschool children with ASC, its use has extended to participants of a broad age range and with varying developmental disabilities (Magiati & Howlin, 2003; Stoner, et al., 2006; Ali, MacFarland & Umbreit, 2011). Research has demonstrated that the

PECS contributes to concomitant benefits, such as facilitating speech development, decreasing the number of tantrums and mitigating problematic behaviour (Bondy, 2012; Magiati & Howlin, 2003; Ganz et al., 2012; Magiati, Tay & Howlin, 2014). However, the published evidence regarding the effectiveness of PECS is still limited, and the majority of the research is anecdotal in nature (Iacono, Trembath & Erickson, 2016). Thus, there is a persisting need to further investigate several areas of the programme.

As a consequence of advancements in current technology, iPads and other mobile technologies can provide powerful tools with the potential to enhance communication among individuals with ASC.

2.7.3 Applied Behaviour Analysis (ABA)

As a behavioural science approach, ABA is dedicated to the experimental study of socially significant behaviour as a function of environmental variables. It is a systematic process which applies interventions and is based on the principles of learning theory (Skinner, 1953; Kearney, 2015). The approach aims to improve socially significant behaviours to a meaningful degree as well as determine whether the employed interventions were responsible for improvements in behaviour (Carpintero, Del Barrio & Mababu, 2014). In recent years, researchers have built upon the ABA framework to develop a vast number of interventions and models for children with ASC.

In the early 1970s, researchers developed behavioural techniques to address target behaviours. Such techniques use reinforcement-based strategies in conjunction with aversive procedures or extinction[5] (Matson, Hattier & Belva, 2012). However, the

[5] Aversive procedures involve the application of or removal of stimuli in order to decrease the likelihood that a particular behaviour will occur again in the future, for example, time-out procedures

emphasis of ABA has changed over the years as researchers have refined methods and analysed different factors to enhance the effectiveness of treatment for children with ASC. Several models have emerged that are based on the ABA framework but entail different procedural features and contexts of implementation. These include Early Intensive Behavioural Interventions (EIBI) (Peters-Scheffer, Didden, Korzilius & Matson, 2012), Early Start Denver Model (ESDM) (Dawson, et al., 2010; Klintwall & Eikeseth, 2014) and the Lovaas model (Reichow, 2012). The models incorporate a myriad of techniques, such as discrete trial training (Reichow, 2012), prompting (Finke et al., 2017; Tekin-Iftar, Collins, Spooner & Olcay-Gul, 2017) and peer-mediated interventions (Zagona & Mastergeorge, 2016). Several reviews of the efficacy of evidence-based comprehensive treatments, with the exception of the Lovaas model, have yielded limited evidence regarding the efficacy of comprehensive treatments for young children (Klintwall & Eikeseth, 2014; Iacono et al., 2016; Robinson & Bond, 2017). However, these findings do not necessarily indicate that the ABA framework is ineffective, and educators and parents should choose interventions that are most suitable for the children.

2.8 Music Research on Autism

The available literature on the general teaching of individuals with ASC presents some clear themes and commonalities, including the following: a focus on understanding the individual strengths and challenges of each individual with ASC; the adaptation of lesson plans depending on skill level and functioning; adjustments to communication style, such as through the use of visual aids or speaking with simple words and sentences; maximising strengths; and decreasing sensory distractions.

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which involve removal of the individual from attention or removal of a high preferred stimuli. Extinction procedures involve stopping the reinforcing consequence that was previously maintaining the behaviour, thereby removing the motivation for the problem behaviour (Minshawi et al., 2014).

Although various assessments have proven the effectiveness of the interventions, none has explored the potential role of teaching organised sound and music to advance the learning of children on the autism spectrum. Current literature on the benefits of music for individuals with ASC is abundant, but it predominantly focuses on uses of music as an intervention or therapeutic tool to treat the symptoms of ASC. Accordingly, it has directed less attention to effective music instruction and opportunities for music enjoyment and learning for individuals with ASC. There is therefore limited research and literature that addresses how these individuals, who might exhibit musical strengths, can effectively and appropriately learn musical skills or acquire access to such approaches.

Music education is a relevant area of study for ASC given that current research, anecdotal literature and reports have illustrated the ability of music to provide individuals with ASC with an avenue to living a meaningful life (Ockelford, 2007; 2010; Schott, 2016). Furthermore, the literature suggests that many individuals with ASC demonstrate superior musical skills (Ockelford, 2007; Miller, 2014; McPherson, 2016). Nevertheless, research has rarely considered approaches and strategies to teach music to individuals with ASC. The present project is based on the premise that the use of music, which has been underexplored, could complement other approaches. The study explores preliminary research evidence on how to systematically use the piano as a resource to support children with ASC in the early stages of musical development. Rather than focusing on the use of music for treatment purposes, I am particularly interested in ways to recognise, maximise and foster strengths for individuals with ASC by teaching them how to play music.

2.9 Choice of the piano

Several music therapy sessions have used the piano as a resource. For instance,

Edgerton (1994) conducted a study that involved one-on-one improvisational music therapy for 11 children with mild to severe autism. In the sessions, the therapist employed the piano, snare drum and cymbals to engage in nonverbal improvisational communication with the child. Another study by Kim, Wigram and Gold (2009), which focuses on facilitating joint attention behaviours, compared music therapy sessions and play sessions with toys. The therapist used the piano as one of the instruments in the sessions and, in this way, explicitly employed it as musical equipment to achieve non-musical goals in music therapy sessions.

There is a lack of research on the impact of the piano in the musical development of children with ASC. The present study considers the piano in view of its ability to illustrate the cause-and-effect relationship in the early stages of musical development; for example, pressing a given key always has the same effect. By offering a distinct response of acknowledgement as soon as children initiate sounds on the instrument, teachers can reinforce an awareness that their actions can have an effect, which could thereby contribute to 'developing cognisance of a sentient "other" out there' (Ockelford, 2013, p.203).

Unlike string or brass instruments, which may present no immediate physical logic behind the production of sounds, the design of the piano ensures an immediacy and consistency of sound, as pressing a given key always generates the same pitch, regardless of technique. Thus, it is a particularly useful medium for direct repetition and imitation, which is suitable for children with autism since they seek regularity, simplicity and consistency. In addition, the instrument's design enables children and tutors to engage in 'proto-conversations', which are meaningful exchanges, such as the communication between a mother and her baby, that transmit a message that is understood by both parties without involving an elaborate sign system. Furthermore,

the size and materiality of the piano promotes interactive play through shared activity (Ockelford, 2013). Shared attention is a significant notion in this context; by concentrating on the same keys and the process of imitating the production of simple sounds, teachers and children attune their attention to each other. One demonstrates, the other imitates, and the imitation itself is then supervised, which cultivates an attention feedback within the space that is created around the instrument. Since they work closely on a one-to-one basis, this process can generate a meaningful yet simple bond between the adult tutor and the child.

2.9.1 Absolute pitch (AP)

The estimated prevalence of AP in Western populations is 1 in 10,000 people (Takeuchi & Hulse, 1993), but the phenomenon is far more prevalent among children with ASC (Ockelford, 2013). Studies using parental questionnaires have estimated that the percentage of children with ASC who have absolute pitch varies between 8% (n=118) (Vamvakari, 2013) and 21% (n=305) (Reece, 2014). This unusual phenomenon is reflected in the WCC, which, as we have seen, specifies a tendency for children with ASC to focus on parts rather than the whole. However, Heaton (2003) and Mottron, Peretz & Menard (2000) discovered that this tendency is not the case for music processing in autism. Heaton (2003) observed a global bias in the autism group for processing chords. Similarly, when Gestalt-preserving changes were made to one of a pair of melodies, participants with autism judged both melodies as the same (Heaton, 2005). These studies imply that the global deficit is not applicable to music processing in autism.

According to Ockelford (2013), AP affects the likelihood of children learning to play an instrument, as they have an ability to map the sound (pitch) that they hear and produce it on an instrument, which is often the piano or a keyboard. AP can motivate

and enable young children with ASC to begin learning any instrument that they encounter and develop instrumental skills at an early age without formal training (Ockelford, 2013). For children with ASC who have AP, the ear leads the hand.

2.9.2 Current piano pedagogies in the UK

The pedagogical approach that a teacher employs is a crucial component of effectively using the piano as a resource for development. Two approaches exist in the field of piano pedagogy. Before the 20th century, piano teaching was linked to a particular school of teaching or playing techniques that was advocated for by an individual, or it followed a national approach (Russian, French or German). During the 20th century, the development of educational materials integrated music teaching and learning, child development and psychological theories, which affected the philosophy of piano pedagogy (Uszler, 2000). In the UK, a recent study reported that 96% of piano teachers were still using a notational approach to teach the piano (Cathcart, 2015). This approach entails progressing through tutor books and learning to read notation, and lessons include the learning of scales and repertoires in preparation for piano examinations. This style is consistent with the requirements of the leading music examination boards, such as The Associated Board of the Royal Schools of Music (ABRSM) and Trinity, which emphasise the importance of musical literacy (Cathcart, 2015; ABRSM, 2013). Such an approach may not be suitable for teaching children with 'classic' autism, as the simultaneous reading of notation and execution of notes is likely to exceed their learning and communication abilities.

Some piano teachers in the UK do employ specialist pedagogical approaches, such as the Suzuki method, which do not emphasise notation or which, like the Colourkeys method, propose using simplified notation (Suzuki, 1983; Suorsa-Rannanmäki, 2013). The Suzuki method, which is also known as the 'mother tongue method', was

developed by the Japanese violinist Suzuki Sinichi in 1945 (Mills, 1973; Suzuki, 1983; MacMillan, 2007; Mehl, 2009). Suzuki's philosophy assumed that talent can be taught if an appropriate training and learning environment are provided (Hendricks, 2011), which resembles how native language is taught to young children. The key difference between the Suzuki method and conventional musical training is its emphasis on rote teaching before note reading. Children are taught to play by ear through demonstrations by their teachers since, according to Suzuki, extensive listening is essential during the initial stage of the instrument learning (Suzuki, 1983; MacMillan, 2007). It is worth noting that the reputation of this method emerged from Suzuki's personal inspiration rather than from a system that has been researched and detailed systematically. There is a need for researchers to further investigate and evaluate its underlying pedagogical context and its effectiveness. A more important consideration for this project is that such an approach may be suitable for some children on the autism spectrum.

Another new specialised piano pedagogy is Colourkeys (Suorsa-Rannanmäki, 2013), which offers a Kodály-based approach for beginners. The key element, which derives from the ideas of Kodály, is the stress on the development of inner hearing skills in a scenario in which children begin singing music before performing it on the piano. Singing requires rapid internalisation of sound and provides immediate participation in the musical experience, thus developing the inner ear (Houlahan and Tacka, 2008). Unlike conventional methods, which involve simultaneous reading of staff notation and playing notes on the instrument, the Colourkeys method introduces a new system of notation. First, students are taught the alternative notation based on solmisation (tonic sol-fa), which uses hand gestures to represent each note. Then, the learners are encouraged to sing the notes while reproducing them with the appropriate hand

gestures. Students start to play the instrument only after learning the solmisation, and they are taught a simplified version of staff notation, which introduces one line of the musical staff at a time. Despite the innovative nature of this method, it may not be appropriate for children with severe autism who are non-verbal and therefore unable to grasp the concepts. Moreover, the songs within the Colourkeys materials are mostly Hungarian in origin and generally written in pentatonic scale, which may not be readily assimilated by children in the UK who are exposed to tonal Western music. Initial work with autistic children may necessitate a child-centred approach that first employs musical materials that are familiar to the child.

2.10 The Sounds of Intent (SoI) framework

There is seemingly an overall lack of piano pedagogy approaches that are suitable for teaching children with ASC. Therefore, this study uses the only developed framework to date – the Sounds of Intent (SoI) framework – to develop and test the appropriate strategies for children with ASC at each level of musical development.

The SoI framework investigates and promotes the music development of children and young people and covers the whole range of ability from PMLD to autism with or without exceptional musical abilities. The framework is the culmination of over a decade of research and is based on three main elements: data based on hundreds of observations of children with learning difficulties and/or autism as they experience or engage with music; analysis informed by psychological research pertaining to 'typical' early musical development; and a foundation of zygonic theory, which seeks to explain how music makes sense to us all. The approach identifies six stages of musical development across three domains of musical engagement: 'reactive' (children's responses to sound and music), 'proactive' (children's creation of sound and music on their own) and 'interactive' (children's interaction with others through sound and

music). The six levels were observed among a population of individuals with intellectual diversity that ranged from children with PMLD to young people on the autism spectrum. This breadth highlights that it is an inclusive model which represents a broad range of creativity and supports children who demonstrate their 'intent' and engagement in various ways based on their own path of development (Voyajolu & Ockelford, 2016).

At the first developmental level, a child seemingly makes no response to sound or music and does not intentionally create sounds independently or with others. At the sixth level, the child exhibits the skills and knowledge of a culturally aware, technically advanced and expressive performer (Welch, Ockelford, Zimmermann & Himonides, 2009; Ockelford & Vogiatzoglou, 2010; Vogiatzoglou, Ockelford, Welch & Himonides, 2011). The framework is informed by a detailed analysis of hundreds of video observations that evidenced that musical development is a multi-dimensional process. The children were observed listening and responding to sound, creating and controlling sound, and generating sounds with the participation of others.

The SoI framework is portrayed as a series of concentric circles wherein each of the three domains of engagement with music is represented by a 120° sector (see Figure 1). The framework is arranged with Level 1 as the innermost part of the circle and expands systematically to Level 6, which is positioned on the outermost part of the circle. Although the six developmental stages within each domain align across sectors, they do not necessarily connect since the profiles of attainment of children may not be uniform. The segments are labelled with 'R' for 'reactive', 'P' for 'proactive' or 'I' for 'interactive' followed by the number of the level that is concerned ('R.1', 'P.2', 'I.3', etc.). Each level has a descriptor which captures the ability or engagement that

is perceived at that particular level (see Table 3).

Each level comprises four elements, which are labelled A, B, C and D. Each element is a textual representation of musical engagement that may be observed within the child's developmental level and domain (see Table 3). The elements progress from A to D, which allows for observing each engagement with music and recording it within a level.

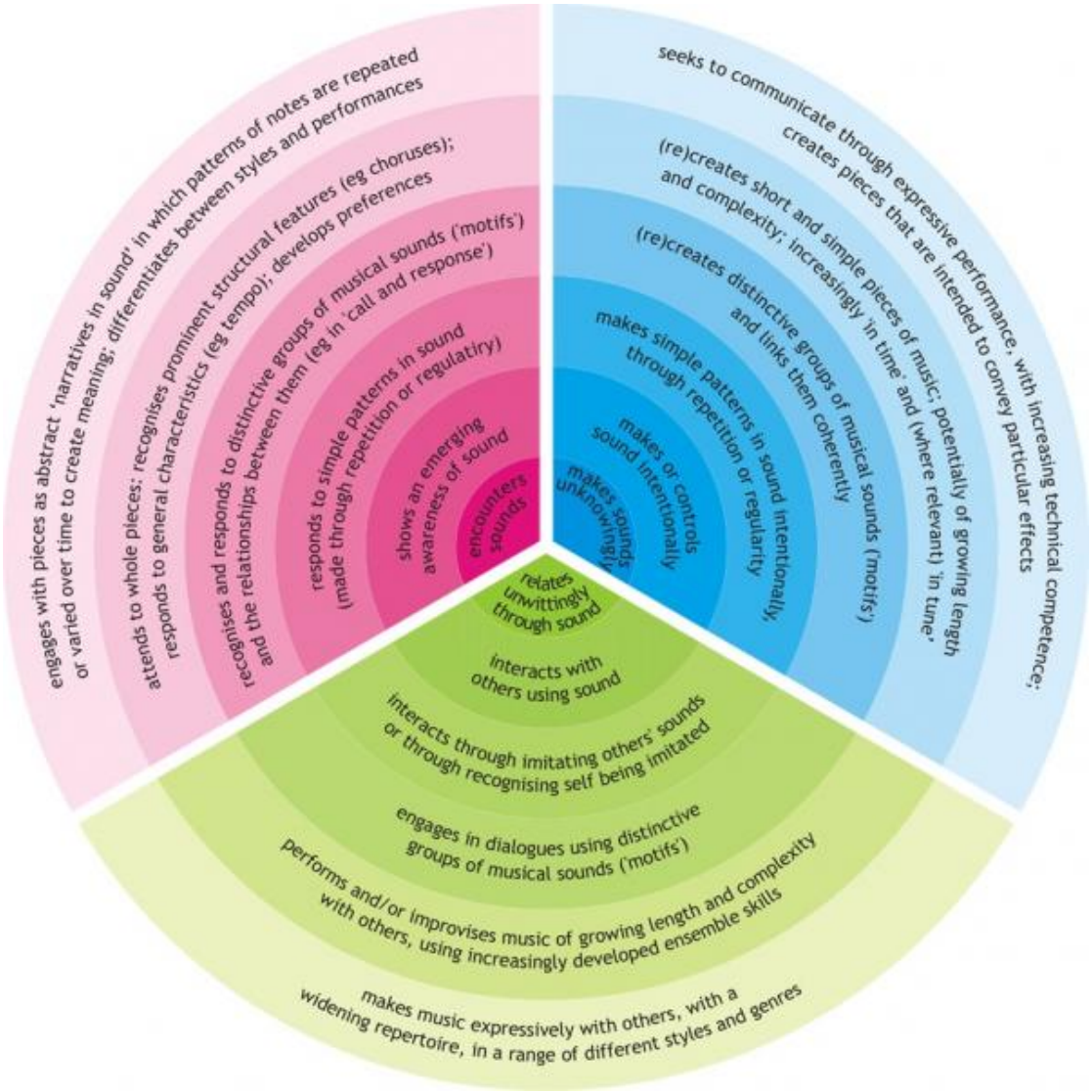


Figure 1. The SoI Framework

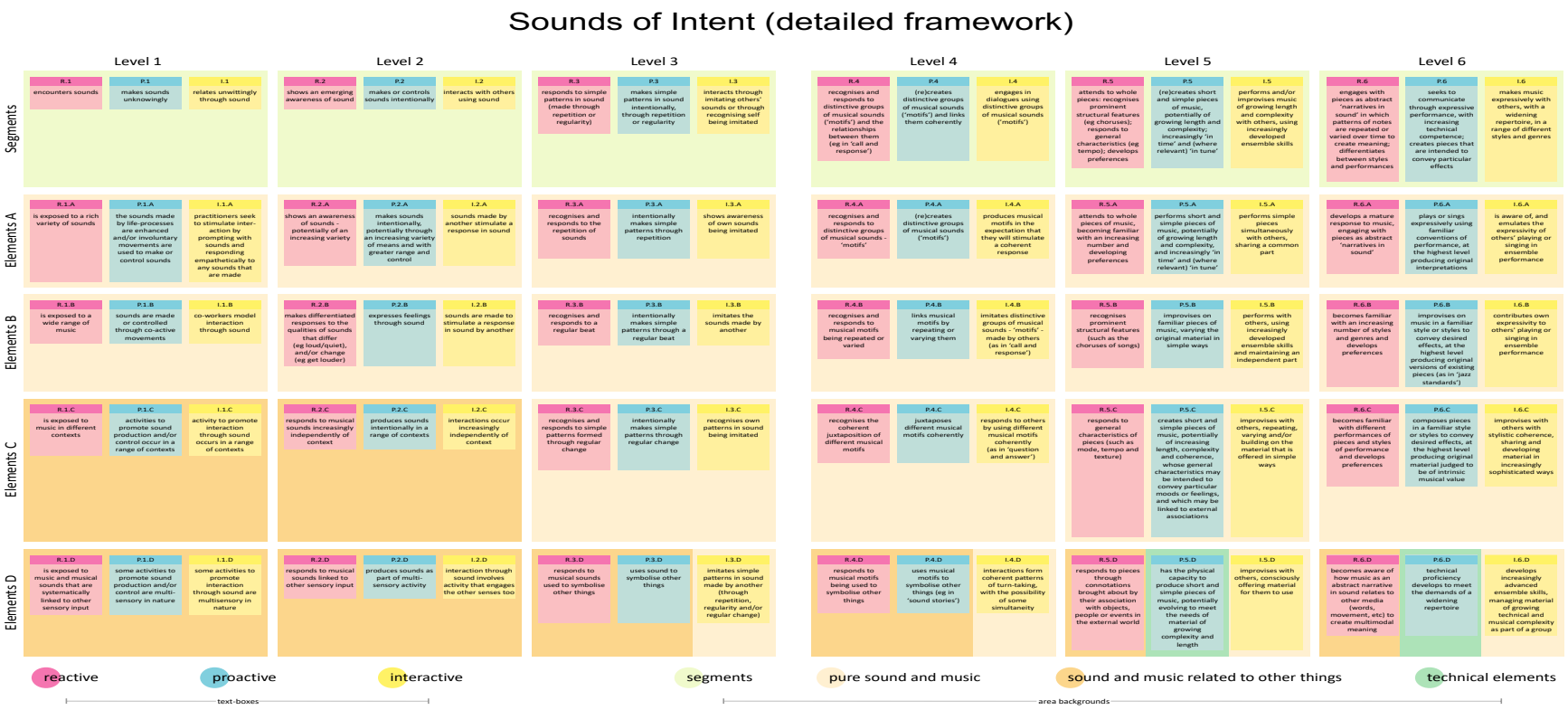


Table 3. The expanded Sounds of Intent framework.

Table 4. The six levels of musical development within the SoI framework, captured by the acronym 'CIRCLE'

Levels	Descriptions	Acronyms	Core cognitive abilities
1	Confusion and Chaos	C	No awareness of sound
2	Awareness and Intentionality	I	An emerging awareness of sound and of the variety that is possible within the domain of sound
3	Relationships, repetition, Regularity	R	A growing awareness of the possibility and significance of relationships between sonic events
4	Sounds forming Clusters	C	An evolving perception of groups of sounds and of the relationships that may exist between them
5	Deeper structural Links	L	A growing recognition of whole pieces, and of the frameworks of pitch and perceived time that lie behind them
6	Mature artistic Expression	E	A developing awareness of the culturally determined "emotional syntax" of performance that articulates the "narrative metaphor" of pieces

While SoI research has generated many resources for practitioners who work with children with learning difficulties,[6] it has directed minimal attention to the use of instruments, especially the piano. This indicates a significant gap, as other studies have suggested that the piano is a particularly suitable resource for children on the autism spectrum because it provides immediacy, consistency and the capacity to produce multiple sounds at the same time (Ockelford, 2007; 2012; 2013). The present study seeks to address this research gap. To this end, it focuses on only Levels 2, 3, 4 and 5, as children who function at Level 1 (no response to sound or music) are not able to engage, while Level 6 entails mature engagement which equates to highly skilled

[6] See www.soundsofintent.org.

performance, the skills for which can be obtained from current piano pedagogies.

2.11 Relevance of SoI to Early Years Musical Develpment

Existing pedagogies assume that children already possess a degree of understanding of musical structure. Consequently, they are not suitable for teaching children with ASC who have PMLD, as they have yet to achieve the ability to cognitively process sound (Ockelford, 2018). The SoI recognises a 'pre-structural' stage in the evolution of musical understanding in which sounds are appreciated and produced purely for sensory pleasure. Therefore, the SoI framework of musical development underpins the theory behind this study, as it imparts new insights pertaining to piano pedagogies for early-years musical development (pre-structural stage).

The auditory perception of foetuses becomes fully functional between 24 and 28 weeks of gestation, when they are able to detect their mother's voice and respond to other environmental and musical sounds that they hear while in the womb (Lecanuet, 1996; Graven & Browne, 2008). Studies of this developmental period have revealed that infants learn the fundamentals of speech and language through the recognition of prosodic features in the 'sing-song' style of communication between a parent and infant, which is known as 'motherese' (Papousek, 1996; Trehub et al., 1997). Malloch and Trevarthen (2009) have regarded this phenomenon as 'communicative musicality', which involves a noticeable pattern of timing, vocal timbre and melodic gesture in the communication between mother and infant. Such early proto-conversations follow typical rules of musical performance, such as distinct timing and melodic narratives. Such adherence is nonintentional and reflects the intrinsically musical nature of human interactions. Studies have also illustrated that infants respond differently to auditory stimuli that are presented in utero and exhibit a preference for their mother's voice (DeCasper & Fifer, 1980; DeCasper & Spence, 1986). In several studies, infants

recognised music to which they were systematically exposed in the womb. For instance, Hepper (1991) found that babies who had regularly heard a specific piece of music before birth responded with heightened alertness, a lower heart rate and fewer movements, while Granier-Deferre, Bassereau, Ribeiro, Jacquet and DeCasper (2011) have observed that infants exhibited a clear cardiac reaction four weeks after their birth following six weeks of exposure to a prenatally presented melodic stimulus. Similarly, Partanen, Kujala, Tervaniemi and Huotilainen (2013) have reported that repeated prenatal exposure to "Twinkle Twinkle Little Star" could induce neural representations that were maintained for several months after birth. After the emergence of sound, children begin to respond by making sounds in an act known as 'music babbling' (Moog, 1976), which develops after six months of life. This stage of early musical development, wherein sound and music elicit responses, corresponds to Level 2 of the SoI framework. This ability then leads to music perception in the first year of life as well as children's early cognition of musical sounds and structures.

Infants between 6 and 18 months of age begin to move rhythmically to music (Zentner & Eerola, 2010; Moog, 1976) and perceive musical patterns. Although the movement does not always synchronise with the music, they are able to move with the musical tempo (Adachi & Trehub, 2018). Clayton, Sager and Will (2004) have described the formation of a regular pulse in the mind of a listener that is cognitively and physically synchronised with movement. In this phenomenon, which arises through the process of 'entrainment', pulses interact, and the movement occurs at the same rate. Hannon and Johnson (2005) found that seven-month-old infants can categorise rhythmic and melodic patterns on the basis of the underlying meter. Infants who were presented with metrical melodies detected reversals of pitch and meter but expressed no preference when presented with non-metrical melodies. The authors have concluded that infants

can infer meter from rhythmic patterns and can employ this metrical structure to secure their knowledge acquisition in music learning. The SoI framework categorises such musical behaviour into Level 3. According to Plantinga and Trainor (2009), infants as young as two months of age are able to distinguish a simple familiar melody from a new one, which indicates that they are 'sensitive to the sequential pattern information in melodies' (p.3). This ability indicates that children and infants at this stage not only intuitively learn to compare one sound with another but also acquire a sense of sound repetition that can represent the notion of intentionality (Ockelford, 2017). In this stage, the concept and awareness of imitation start to develop. Adachi and Trehub (2018) have found that, by their first birthday, infants started to mimic the actions of parents and, eventually, to babble.

This capability then progresses into the emergence of distinct melodic phrases. Wermke and Mende (2009) suggested that the crying of babies involves a certain melodic feature whose contours resemble those of the native language to which they are exposed (Mampe, Friederici, Christophe & Wermke, 2009). Papousek (1996) noted three phases in the development of infant's babbling from vocal play. In the first phase, infants demonstrate persistent motivation to reproduce sounds that they discover by chance, and they repeat and modify their vocal products with eagerness and joy. The second phase entails 'canonical babbling', which 'is characterised by a much more restricted vocal repertoire than the preceding stage of vocal expansion due to the emergence and transitory prevalence of rhythmic syllabic sequences' (p. 105).

The third and final phase involves 'variegated babbling' of short, well-structured melodies that creatively combine musical elements into new patterns with distinct rhythms and accents (Papousek, 1996). Such self-initiated musical creativity yields 'potpourri' songs (Moog, 1976), which are constructed from fragments of familiar

songs that children have encountered. This development corresponds with Level 4 of SoI framework, when children start to understand musical motifs.

The emergence of short, distinct melodic phrases is followed by the development of longer structures that are created through repetition (Welch, 2006) and, on occasion, variation (Hargreaves, 1986). This activity gradually leads to reproducing songs with an increasingly secure tonal and metrical framework (Hargreaves, 1986). In a study by Voyajolu and Ockelford (2016), most of the children had reached this stage by the age of four and were able to both synchronise an external tempo and sing in tune. At this stage, children are musical experts (Ockelford, 2017). This developmental stage is also the point at which neurotypical children begin their instrumental lessons.

If one is to follow the starting age of the instrumental lesson as stated in the musical development above, it fails to include children with severe learning diffiuclties or profound and multiple learning difficulties who do not match the chronological age of musical development found in neurotypical children. The Sounds of Intent framework is the only inclusive model that is deisgned for the population of those with intellectual impairment.

2.12 Notion of capability

The review of strategies within various autism pedagogies (i.e. TEACCH, PECS and ABA) reveals that their materials draw on the individual strengths and challenges of each individual with ASC, and they accordingly adapt lesson plans depending on skill level and functioning. Such approach is in line with Terzi's (2005) notion of capability, which presents capabilities as the opportunities and freedom to achieve valued functioning. Valued functioning refers to the 'beings' and 'doings', such as walking, reading and being educated, that individuals have reason to value. Capabilities are regarded as combinations of functioning ('beings' and 'doings') that one person can

achieve (Sen, 1992).

According to Sen (1992), people are diverse in three fundamental ways: personal characteristics, such as gender, age, physical and mental abilities; external circumstances, such as environmental factors; and the ability to convert resources into functioning (p.85). The variations that these differences involve are central to the capability metric and must be accounted for when addressing the demands of an individual. Capabilities represent effective opportunities for people in achieving valued functioning. According to Robeyns (2005, p. 95), 'the distinction between achieved functioning and capabilities is between the realised and effectively possible; in other words, between achievements on the one hand, and freedoms or valuable options from which one can choose on the other'. Therefore, capabilities are freedoms by which one can choose to achieve functioning that is feasible. This notion of capability is core to this study, which develops new piano pedagogy approaches according to the functioning of children with ASC and their capabilities.

2.13 Vygotsky's zone proximal development (ZPD)

Wiggins and Espeland (2018) have framed learning and teaching as a social process (Rogoff, 1990; Vygotsky, 1978; Wenger, 1998). Individuals learn from each other, and even when people learn independently, they employ processes, strategies and information that they have previously learned from others or utilise products that others have created. Therefore, the social nature of both making and learning music is critical when planning musical learning experiences. Vygotsky considered learning to be a shared joint process in a responsive social context (Gindis, 1999; Vygotsky, 1978) and stressed the importance of dynamic interaction in advancing individual development. He opined that human mental functions first originate socially between people (interpsychological) and then continue within the child (intrapsychological),

and they range from voluntary attention and memory to the formation of concepts.

In the Vygotskian framework, children are capable of more competent performance when they have the necessary assistance. This concept is known as 'scaffolding' and is relevant to the present study because, although music-making can be accomplished alone, children with ASC benefit from music sessions that offer a secure framework through which they can experience and develop many of the skills and disciplines of social interaction (Ockelford, 2013). These benefits are especially possible from sessions that are undertaken on a one-to-one basis, whereby the teacher and child work in close proximity and establish not only an intimate connection with the shared activity but also a close interpersonal relationship (Ockelford, 2013). Vygotsky has discussed how '[t]he zone of proximal development defines those functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state' (Vygotsky, 1978, p.86). This insight highlights the significance of the environment for learning and development in early years. Adults must first scaffold this environment before children can proceed with creating and replicating the materials alone. The idea of scaffolding implies that the process of constructing knowledge occurs when a more knowledgeable person supports the development of understanding of such knowledge or ideas (Rogoff, 1990; Vygotsky, 1978). The vision of scaffolding within this project includes the teacher's support of the child's piano-learning experience by providing appropriate groundwork to foster and enable the child to succeed in producing sounds on the instrument. According to North and Hargreaves (2008), a more flexible and ecological perspective is needed in considering a child to develop musically through musical participation with others. They pointed out that it is through social engagement that the child gradually progresses to become a developing musician who gradually builds

competence for what music is for. For instance, the music provides us of access to close relationships with others, sharing thoughts and feelings non-verbally with others and making music that influence and shape others' actions. Therefore, in this study, my role as the teacher is a crucial component in forming such relationship to provide support and scaffolding in fostering musical development of the children. Such scaffolding is envisioned as characterising the teacher's role in that it encompasses all decisions that inform and frame the relationship between the teacher and learner as well as the nature of those decisions. This context cultivates a healthy, productive learning environment in which students have ample opportunities to engage with the learning content.

Chapter 3. Methodology

3.1 Introduction

This chapter discusses the rationale behind the methodological approaches used in this study and gives a detailed account of the methods chosen and the ethical considerations involved.

3.2 Aims and research questions

The aim of the research is to explore the use of the piano as a tool for engaging children on the autism spectrum who have learning difficulties to promote musical skills. The study seeks to develop a number of pedagogical strategies that may be appropriate for children at each level of musical-development. The study considers the following research questions:

1. Can the piano be used as a medium to promote musical skill when engaging with children with ASC who have learning difficulties?
2. Which strategies are appropriate for children at each musical-development levels?

3.3 Rationale behind the design of the study

This research uses exploratory multiple case studies to develop and evaluate new approaches to piano pedagogy that may be suitable for children with autism who are functioning at different musical-development levels. As described by Yin (2011), the case study methodology is an approach to enquiry in which the researcher explores, in depth, a programme, an event, an activity, a process, or one or more individuals. For this study, the phenomenon under investigation is the use of the piano as a medium through which to engage children with ASC who have learning difficulties, to promote musical skill. The SoI music-developmental framework (Welch, et al., 2009;

Ockelford & Vogiatzoglou, 2010; Vogiatzoglou, et al., 2011) was selected to test the effects of the intervention strategies because it appears that there is a lack of piano pedagogical approaches suitable for teaching children with ASC.

The methodological rationale is based on conditions outlined by Yin (2011), who stresses that a case study allows the researcher to go beyond quantitative statistical results and understand social and behavioural conditions from the perspectives of the researcher and the participant. By including both quantitative and qualitative data in a case study, this can help to explain both the process and the outcome of a phenomenon through complete observation, reconstruction and analysis of the case under investigation (Tellis, 1997). An exploratory case study design was chosen for the preliminary examination of the use of the piano as a tool to engage children with ASC to promote musical skills. According to Yin (2011), the exploratory case study sets to investigate distinct phenomena characterised by a lack of detailed preliminary research, especially formulated hypotheses that can be tested. This corresponds with the design of this study.

A case study is also a triangulated research strategy in which triangulation can occur with data, investigators, theories, analysis and methodologies (Tellis, 1997; Hussein, 2015). Creswell and Miller (2000) explain triangulation as ‘a validity procedure where researchers look for convergence among multiple and different sources of information to form themes or categories in a study’. The importance of triangulation is to ensure accuracy and credibility of the results. Five types of triangulation have been identified (Hussein, 2015):

1. Data triangulation, different sources of information is used to increase the validity of the study;

2. Methodological triangulation which involves the use of multiple qualitative and/or quantitative methods to study the investigation;
3. Investigator triangulation which involves several investigators during the analysis process;
4. Theory triangulation involves using multiple perspectives or disciplines to interpret a single set of data; and
5. Analysis triangulation involves using more than two methods of analysing the same set of data for validation purposes.

This project adapted analysis and investigator triangulation as they offered some advantages in dealing with validity threats stemming from the biases inherent in any single method. First, a level of close scrutiny is fundamental to the design and evaluation of the more effective strategies for teaching children with ASC how to play the piano. By using the case study method, hypotheses can be generated for further enquiry. The study followed a mixed methods approach for data collection and analysis. The rationale of using a mixed methods approach is to deal with the complexity of the evaluation of the strategies. Combining methods helps to gain an increased understanding of human behaviour and experience (Morse, 2003). Consequently, mixed methods approach can provide a more comprehensive account of the area of enquiry. The data is first analysed quantitatively using coding criteria established from the systematic observations. The data is then further analysed and explained by looking at two aspects: the teacher's thought-process, and factors that affect the children's learning. This continuous interplay between quantitative and qualitative analysis serves to provide validation and a complete picture of the phenomenon being studied. Secondly, by appointing external investigators to examine the quantitative data, the findings can be compared to confirm consistency and

accuracy to ensure reliability and credibility.

3.4 Case study

According to Green, Camilli and Elmore (2012), a carefully conducted case study benefits from having multiple sources of evidence to ensure that the study is as robust as possible. It is important to triangulate sources of data to ensure comprehensive results that reflect the understanding of the participants as accurately as possible. Action research is used within case studies where I play an active role as the teacher in implementing the strategies. Carr and Kemmis (1986) described educational action research as the development of curriculum, professional development, school improvement programmes and system and policy development. Action research provides the practitioner with new knowledge and understanding of how to improve educational practices (Mills, 2011) which is participatory in nature and offers multiple beneficial opportunities for those working within the teaching profession (Johnson, 2012), which in this case is me. My self-interest plays a substantial role in shaping the research at every stage from the choice of the research questions and the conduct of the research, to the ultimate reception of the findings by the research community (Kemmis, McTaggart & Nixon, 2014). By conducting the research, I was able to immerse myself in working with the children directly thus able to provide a self-critical and true reflection of the accounts of events. Here, the aim is to determine the different pedagogical strategies that may be suitable for children with autism at each musical development level. Action research within case studies allowed me to test the effectiveness of pedagogical strategies designed throughout every level of musical development and to constantly reflect on and modify the strategy.

An action framework is used to test the effectiveness of pedagogical strategies that are designed for improving the musical skills of children with ASC across all levels of

musical development. The use of a framework can allow existing knowledge to be organised and enable a more systematic approach to the selection and testing of intervention strategies (Redman et al., 2015; Rycroft-Malone & Bucknall, 2010). Therefore, an efficacious action framework will have to fulfil the following four criteria:

1. Have a clearly articulated purpose — this will be to investigate whether the piano can be used as a medium through which to engage children on the autism spectrum so as to promote their musical skill.
2. Be informed by existing knowledge — the action framework is adapted from the SoI framework, which has been well established and used widely among music researchers to gauge the musical development of children with complex needs and autism.
3. Provide an organising structure to build new knowledge — a draft piano curricular framework has been developed with a number of strategies to be trialled.
4. Be capable of guiding the development and testing of interventions — I participated in testing the interventions with children on the autism spectrum, and video filming has been used for critical self-reflection and further analysis of the data.

3.5 Research sites

Several aspects were taken into consideration when establishing the criteria for choosing the research sites for the project. Firstly, it was hoped to use special schools in Greater London for easy accessibility. Secondly, as the participants were to be children with ASC who have learning difficulties, only special schools accommodating such individuals were considered. I did not consider mainstream

schools due to the lower proportion of the target group attending those institutions. Students from mainstream schools would also most likely present milder manifestations of the spectrum or be higher functioning and hence not suitable for this research. Only special schools with a piano were considered, as this was the essential equipment for the project, and as this study was based on the SoI framework, only schools using the framework to assess their pupils could be selected. Five special schools in London were contacted regarding this study. Two expressed interest and accepted the invitation. Due to confidentiality, they will be referred to as schools A and B.

School A caters for a wide range of complex needs in pupils aged from 3 to 19. The school recognises the value of expressive arts as an essential element in pupils' experiences, opportunities and progress, and music activities are widely undertaken. A music room with a piano was provided for the duration of the project.

School B serves children and young people with ASC aged between 4 and 19. It does not have a dedicated music room, however, a weighted keyboard with 88 keys in a small room was provided. As the school was participating in multiple projects, children from school B were only able to start the project during the second term.

3.6 Ethics

Fourteen children between 5 and 10 years of age were recruited. The sample included a mixture of boys and girls with no prior experience of playing the piano or receiving instrumental lessons. The head teachers of the schools were presented with a project information sheet outlining the objectives of the research, the methods, expected timelines and input requested from the schools, parents and children. Once access to the schools had been established, an introductory meeting was held with the parents of suitable children, during which they were presented with tailored project

information sheets and consent forms. Parental consent was obtained for each participant, including access to the child's Education, Health and Care plan. Parents were informed of the objectives of the study, the methods of research and expected timelines, and their right to withdraw their children at any time without repercussions. This was outlined in the standardised consent form.

Under the University's ethics guidelines, consent is required from both parent and young person if the project involves working with 16–17-year-olds. However, here the young people were unable to provide oral or written consent. According to the British Psychological Society Code of Ethics and Conduct guidelines:

> 'If the vulnerable person is unable to give informed consent, consent should be sought from those persons who are legally responsible or appointed to give consent on behalf of persons not competent to consent on their own behalf, seeking to ensure that respect is paid to any previously expressed preferences of such persons' (British Psychology Society, 2009, p.31).

However, there should be an alternative option of 'an ongoing process of assent' when involving children with autism in research (Beresford, Tozer, Rabiee & Sloper, 2004). Several approaches were taken for the children to provide consent. An introductory meeting was arranged where I explained the purpose and process of the study to the carers. They were then asked to garner consent from the children where possible, given the level of conceptual understanding and the ability to convey their wishes. I was not present so that I did not influence the decision to take part. To ensure ongoing consent and assent (Loyd, 2013), a carer who knows the child very well was present in the room during every session in case the child should indicate that they wanted to

withdraw from the session. Parents were also able to withdraw their child.

As the research involved taking videos, parents were asked to sign a permission form regarding the use of videos and images of their children in publications and presentations before the start of the project. To protect the anonymity of the participants, parents were also asked what footage I was allowed to use. In these permission forms, anonymity procedures were clearly explained. During the analysis process, all participants were assigned a unique ID which only I can identify.

Before the start of the project, I read the safeguarding policies of the school thoroughly so that if at any point during the lesson the children appeared to be distressed I would know how to respond, such as immediately stopping the piano lesson and filming. For children with a history of aggressive behaviour, I obtained this information from the parents and teachers during their interviews and always had a member of school staff present in the room in case any unforeseen circumstances arise.

I was aware that when working for extended periods of time in research settings with children, the children can become reliant on the relationship with me. Ending such relationships may cause distress to the participants (Iversen, 2009) and therefore careful consideration was applied during disengagement. I organised a farewell and thank you concert where children performed to their parents, teachers and classmates, showing what they learned in the lessons. I then formally said goodbye and thank you to each of the children by presenting cards. Carers were also involved in helping to explain the situation to the participants using their preferred medium of communication. Organising such an event at the end of the study gives a sense of closure for the children.

3.7 Participants

Fourteen children with ASC who met the following criteria were recruited from the abovementioned special schools:

1. Diagnosed with ASC with severe learning difficulties;
2. No prior instrumental lessons;
3. Falls into one of the SoI Level 2 to 5;
4. Consent from the parents to allow the child to participate in the study.

As the schools had already been using the SoI framework to assess pupils' musical development, the children were selected by their respective music teachers who had a good understanding of who were suitable for participating in the project. This was based on their musical interest and behaviours observed during their music sessions. The sample included a mixture of boys and girls and they were drawn from a wide range of ethnic and cultural backgrounds, typical of London. The sample matches the trend of the population where 80-90% of the children participated in this project were male (Fombonne, 2018; Kogan et al., 2009). Table 5 provides some general information on the participants.

Table 5. Participants

Levels	Child	Gender	Verbal	SEND Profile	Ethnicity	Age
2	1	Girl	Non-verbal	ASC with significant learning difficulties	Brazilian	6
	2	Boy	Non-verbal	ASC, ADHD and Global Developmental Delay	Pakistani British	8
	3	Boy	Non-verbal	ASC with significant learning difficulties	African	8
	4	Boy	Non-verbal	ASC with significant learning difficulties, severe communication and social difficulties.	Congolese	9
3	5	Boy	Limited verbal	ASC with significant learning difficulties, severe language and communication difficulties	Sierra Leonian	9
	6	Boy	Limited verbal	ASC with significant learning difficulties	Other Asian	9
	7	Boy	Verbal	ASC with Global Developmental Delay	Somalian	9
	8	Girl	Limited verbal	ASC with significant learning difficulties	African	8
4	9	Boy	Limited verbal	ASC with significant learning difficulties	Polish	15
	10	Boy	Verbal	ASC with significant learning difficulties and severe behavioural difficulties	Indian	15
	11	Boy	Verbal	ASC with significant learning difficulties and significant visual impairment	Somalian	10
5	12	Boy	Verbal	ASC with significant learning dificulties	Black-Ghanaian	15
	13	Boy	Verbal	ASC with Global Developmental Delay	White	10
	14	Boy	Verbal	ASC with significant learning difficulties, severe communication and social difficulties	African	16

3.8 Procedures

Weekly one-to-one piano lessons were conducted during the summer and winter terms of 2016, with breaks for half-terms and the summer holiday. The date and time of the sessions was set based on the availability and timetable of the schools. Thirteen sessions were held. The sessions were divided into seven sessions during first term and six during second term. Due to the complex nature of the conditions of each

participant, medical and behavioural issues often meant that they were unable to attend or were absent from school. The attendance of the study is presented below:

Table 6. Attendance

Sessions / Child	1	2	3	4	5	6	7	8	9	10	11	12	13
1													
2													
3													
4													
5													
6													
7													
8													
9													
10										Withdrew from the study by the teacher (reluctant to engage and constantly showing sign of distress)			
11									Withdrew from the study (medical condition)				
12													
13											Left school		
14													

Absent Attended N/A Withdrawn

Children 10 and 11 withdrew from the study as both showed signed of distress and reluctance to attend the sessions and the teacher decided to withdraw them. Child 13 transferred to another school while the study was still ongoing. All of the sessions were video-recorded with two video cameras. Each session lasted 15–30 minutes, with the length dependent on the child's interest and willingness to cooperate. Each piano session had a consistent structure, as follows:

1. The session started with an introductory song — 'Hello Song' — to greet the child hello and introduce the child that the piano session is about to begin before activities on the piano commenced.

2. This was followed by introducing a range of activities on the piano, with draft teaching strategies as listed below.
3. The strategies were implemented one at a time so as to observe each child's response. While the strategy was being implemented, pauses were given for the child to respond.
4. The session always ended with a 'Goodbye Song'. This was to provide the children with a sense of completion.

I had designed the structure so that it was the same as the music teachers used during their general music sessions and provided a sense of whole-rounded session: Opening – Activities – Ending. It began with an introductory song that allowed the child to settle down and adjust to the task. It is known that children with ASC may have greater difficulty in shifting attention from one task to another (Hume, 2008; Bogdashina, 2016). Therefore, a short introduction helped the child to ease into the engagement of the new task and, by ending the session with a goodbye song, it gave a sense of completion. The children became familiar with the overall shape of the lesson and thus had an increased capacity to predict what was going to happen next. Having structured sessions helps to facilitate learning and engagement of children with ASC (Mesibov et al., 2004; Mesibov et al., 2015).

An example of the overview structure of two sessions of Child 2 is shown in Figures 2 and 3. The information contained the structure and strategies used and the duration of each. The sessions varied in duration, with the length dependent on the child's interest and tolerance to cooperate. The strategies were implemented differently in every session based on the previous and immediate reactions of the child. This study applied action research as the primary method with the purpose of evaluating the effectiveness of the newly developed strategies on student's learning. My role as the

teacher was a crucial variable in this study, and I was aware that my pedagogical thinking would directly affect each child's learning and success. The action was supported by Vygotsky's theory of ZPD (1978), which suggests that learners are capable of more competent performance when they are guided by somebody who is more advanced and skillful. Welch (2007) has described effective music teachers as knowledgeable and skilled in diverse musical styles. Moreover, an effective music teacher should know how music is learnt and how to manage an environment to optimise music learning. Therefore, the lessons that I conducted were child-centred with a stimulating, joyful and invigorating atmosphere that incorporated materials that the child liked.

In addition, according to Laprise (2017), to be effective, a music teacher's entire action research cycle requires reflective practice. The teaching process involved constant reflection on and interpretation of the child's musical behaviours and engagement after each lesson to determine the next course of action. Based on such retrospection and the knowledge that I gained from the initial investigation, I modified the strategy to tailor it to each child's learning needs.

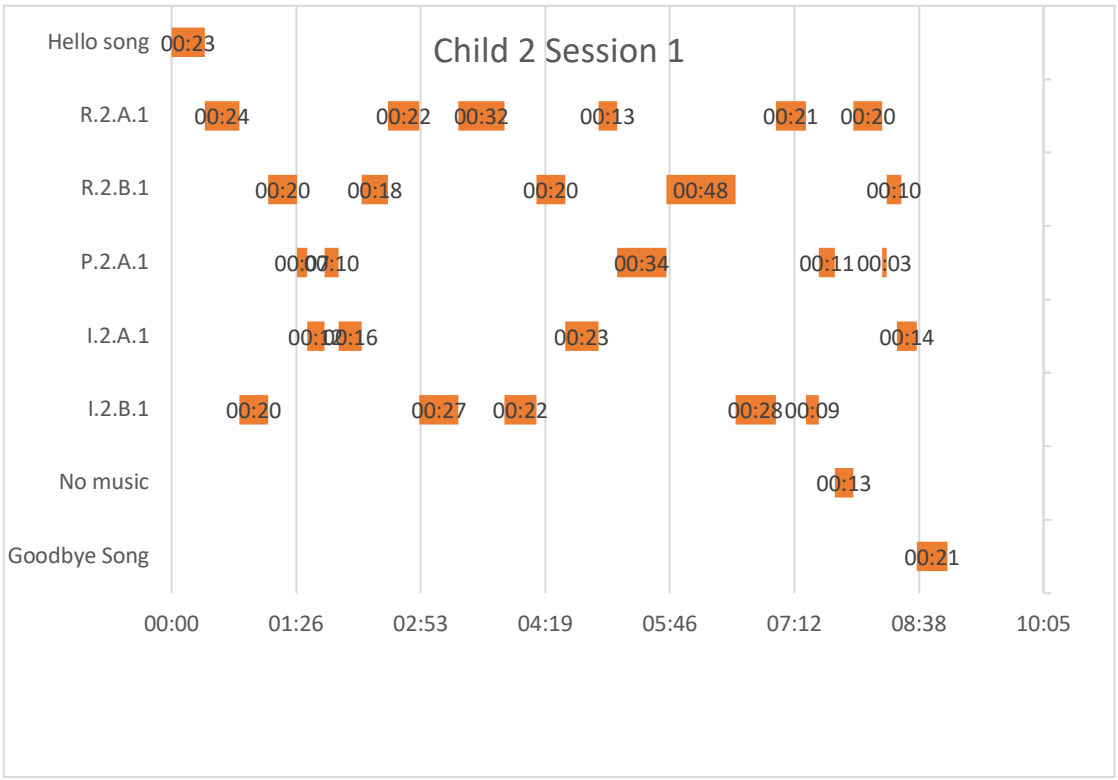


Figure 2. Overview Session 1 of Child 2

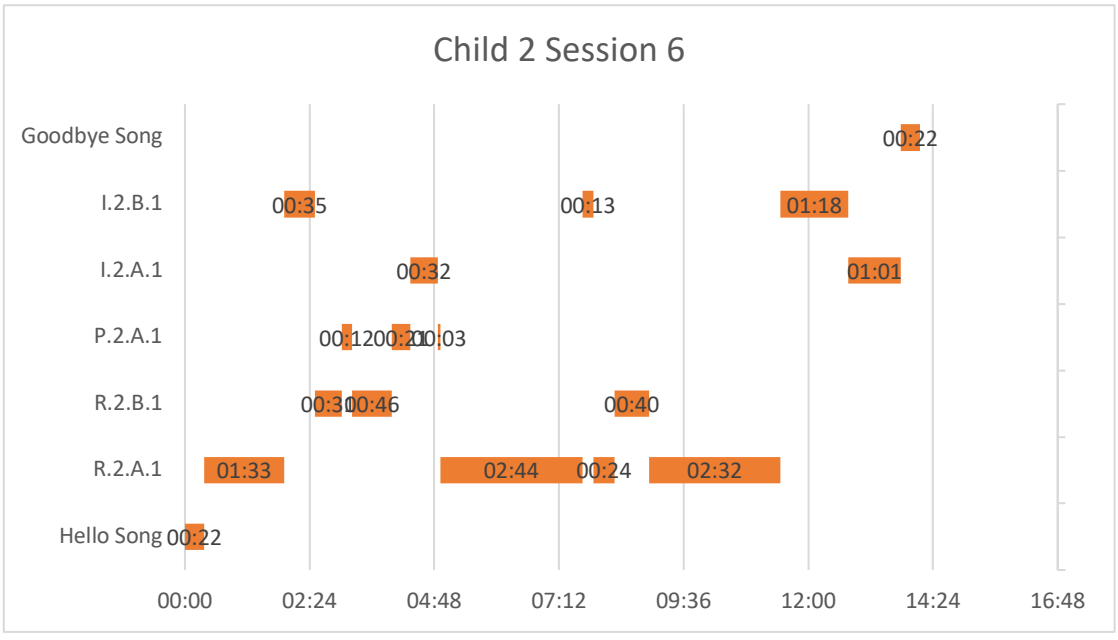


Figure 3. Overview Session 6 of Child 2

3.9 Materials

The materials used for the study derived from a variety of sources. The 'Hello' and 'Goodbye' songs were taken from *All Join In!* (Ockelford, 1996), a set of songs that

originally designed to offer a framework for making music with young people who are visually impaired and have learning difficulties. The material was chosen due to the simple nature of the language used, with the conscious avoidance of abstract concepts or metaphors. The other materials were taken from a variety of genres, such as classical music, jazz, nursery rhymes and pop music. These were chosen based on the musical preferences of the child as suggested by the music teacher, to enhance motivation.

3.10 Data collection

Data collection started with a visit to the participating schools to examine the Education Health and Care plans of each participant and to talk to school psychologists to gather general information and a stronger understanding of their background. A semi-structured interview was undertaken with the music teachers of the participating children to gather information as to their special interests and abilities, forms of communication, behaviours, sociability and personality characteristics. The questions were adapted from a study by Pring and Ockelford (2005) focusing on the musical interests and abilities of blind and partially sighted children with septo-optic dysplasia, as many children with septo-optic dysplasia are also on the autism spectrum and the same questions have been used by others in autism studies including Vamvakari (2014). The questions are included in Appendix 2.

The reason for obtaining these data was that they helped to plan the sessions, so that they were tailored to individual needs. I was able to prepare, in advance, suitable repertoires according to the children's musical preferences. I was also able to determine whether a child had AP and therefore tailor the activities accordingly. Gathering information regarding the children's behaviour and personality enabled me to predict, to some extent, how they were likely to react and engage with me during

the piano lessons.

3.10.1 Settings

School A

The session was conducted in the music room of the school. It is a rectangular room and the piano is at the right corner facing the centre of the room. There is a large space in the middle. The room was arranged to minimise potential distractions and create a possible distraction-free learning environment for the child. The room was tidied before the session and all chairs were stacked away and other instruments stored out of sight. Such a strategy was introduced by Kunce and Mesibov (1998) and is used in TEACCH where the learning environment is modified to accommodate students' learning needs and styles.

Previous studies have shown increased distractibility and an inability to filter irrelevant information in individuals with ASC (Burack, 1994; Murphy, Foxe, Peters & Molholm, 2014), and the recent change in DSM-5 in May 2013 indicates that hyper- or hypo-reactivity to sensory input is one of the diagnostic criteria for ASC. Providing a distraction-free environment can reduce sensory overloading thus directs focus to the relevant task. I sat at the left of the piano and the child at the right on another chair. The camera at the side filmed from the right side of the piano.

School B

The session was conducted in a small room where the children normally have their individual sessions with the teacher or the teaching assistant. It is a rectangular room with the piano in the middle. As the room is used as the sensory room for the children, sometimes there were props lying around. A wall divider was used to split the room into two sections where the props were hidden behind the wall divider.

3.11 Designing the strategies

This research set out to systematically explore the use of the piano as a resource in supporting children with ASC in the early stages of musical development. As the spectrum of their abilities, needs, propensities, motivations, likes and dislikes is so vast, it is difficult to devise a system or approach that suits all. According to Ockelford (2013), one should have a battery of potential strategies, which should be tried and tested in other contexts to support the child with ASC. The SoI framework covers the whole range of ability, from PMLD to those with autism and with or without exceptional musical abilities, to develop and test strategies to promote musical skill for children with ASC. The project thus drew on the domains and elements set in the SoI framework to devise a range of approaches to try and then evaluated them for each music-developmental level.

I sought how to display the information visually by referring back to the two research questions and sought key categories. First, each music-developmental level should be clearly listed with their SoI descriptors. This was to establish the textual representation of musical engagement that may be observed within the child's developmental level. From this, strategies were designed based around the SoI descriptors and possible pupil engagement. These categories were interconnected so while I was implementing the strategies, it was important to identify what impact they had on pupil engagement. The strategies were labelled with a code to help me to record the data more efficiently. Next, to examine the possible use of the piano to promote musical skill through music, the learning objective of each strategy was identified. Finally, to evaluate the effectiveness and success of the strategy, a list of success criteria was drawn up so that I can crosscheck the results of the strategy with the success criteria to access the effectiveness and appropriateness of the strategies. Considering all the above points,

a table was produced with the following titles:

1. SoI element;
2. SoI descriptor;
3. Pupil engagement;
4. Strategies/teacher's input;
5. Anticipated learning; and
6. Success criteria.

Once the categories have been established, the next step was to identify which elements of SoI were appropriate for the piano. As the framework is based on general music teaching in the classroom, some of the elements might not have been a good fit. For example, we can look at Level 2 reactive domain element C: responds to sounds increasingly independently of context. This element will not apply as the piano is the only setting being examined and no other acoustic environments were to be involved. This element also explores how the children react differently on different social occasions and at different times of the day, which is redundant in this study.

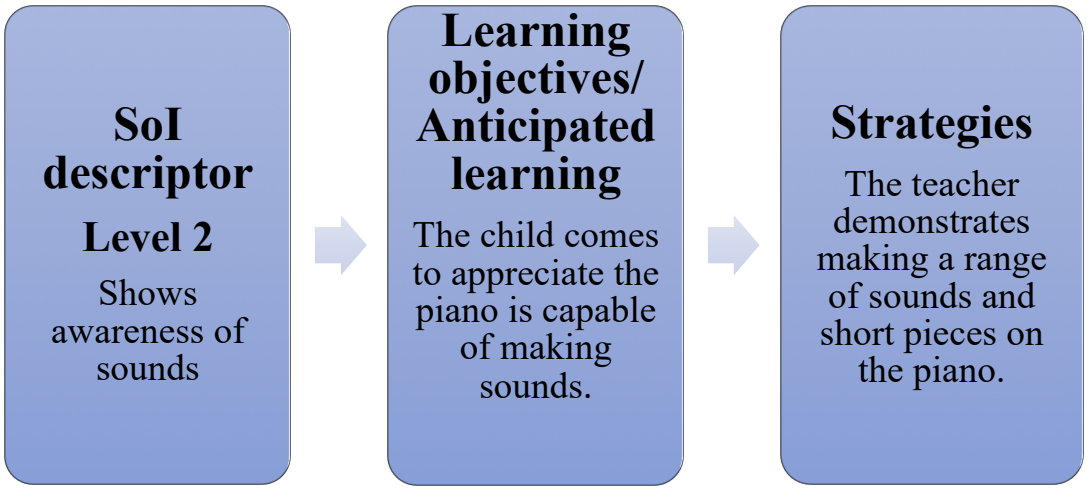


Figure 4. Process of devising strategy based on SoI descriptor

Table 7. Identified elements

Levels	Elements		
	Reactive	Proactive	Interactive
2	A, B	A,	A, B
3	A	A, B, C,	B, C, D
4	A	A, B	A, B, C, D
5	A, B	A, B, C, D	A, B, C, D

Once the elements had been identified, the next step was to devise a range of potential strategies for each level and element. I developed the strategies based on the interpretations and descriptions of each domain and element set out in SoI framework. Figure 4 shows how strategies emerge from the SoI descriptors.

According to the SoI descriptors, children who are functioning at Level 2 will show awareness of sounds. This is then applied to the piano pedagogical context which leads to the learning objective that is the child comes to appreciate that the piano is capable of making sounds. Therefore, a strategy has been devised to achieve the learning objective which involves the teacher demonstrating a range of sounds and short pieces on the piano. A brief discussion of the developed strategies on each music-developmental Level is provided below.

3.11.1 Strategies at Level 2

According to SoI descriptor, children who are functioning on Level 2 have an emerging awareness of sound as a distinct perceptual entity, and of the variety that is possible within the domain of sound. The children react to music largely as a consequence of the basic qualities of its constituent sounds – high/low, loud/quiet, quick/slow. From this perspective, I devise the strategies in each domain (reactive, proactive and interactive) to suit the piano context. In the reactive domain, the strategy involves the teacher (me) making a range of sounds on the piano, such as loud/quiet, high sound/low sound, cluster of notes/individual notes. The teacher then supports the child to intentionally create different ranges of sound which constitute the proactive domain. This in turn will lead to teaching interaction, such as the child and the teacher taking turns in making sounds on the piano, which fulfils the interactive criteria.

3.11.2 Strategies at Level 3

Just as pupils' awareness of how sound is structured as music develops, their capacity to respond to it may also evolve. They may come to savour repetition of one form or another and develop the capacity to anticipate changes in pitch, loudness, tone, colour or tempo. At SoI Level 3, children will have a growing awareness of the possibility and significance of the relationships between the basic aspects of sounds (particularly pertaining to pitch and perceived time), of the special relationships that indicate the repetition of these basic aspects and of the repetition of relationships which results in regularity. In terms of the piano, for the reactive domain, the devised strategy allows the teacher to create simple patterns through repetition, such as repeated notes on the piano, enabling recognition of different pitches and identifying how these differ on different registers. In terms of tempo, one can learn to create a simple pattern through a regular beat. The teacher can then assist the child using a hand-over-hand or hand-

under-hand technique to create simple patterns on the piano. For instance, the teacher may support the child in repeating a note with a regular beat. The piano is a particularly useful medium for direct repetition and is suitable for children with autism who seek regularity and simplicity. The child is still exploring the sound and seeking patterns on the piano at this stage, and therefore techniques of playing will not be involved.

3.11.3 Strategies at Level 4

At this Level, the children have an evolving perception of groups through the acknowledgement of repetition or regularity of aspects of sound and a cognition of coherent relationships between them, involving each group as a whole through transformations or aspects of each group, which effectively links both groups as wholes through their own inner cohesion. At Level 4, the strategy starts when a child is introduced to listening to a simple musical motif on the piano demonstrated by the teacher. This can be a rhythmic or a thematic motif from a particular song or piece that the child is familiar with. This cohesion can be achieved in various ways, such as clapping the motif and reproducing it on the piano or singing the motif and reproducing it on the piano. The objective is to stimulate a joyful and invigorating piano lesson, as music is about having fun and learning. When the child is able to create distinctive groups of musical motifs, they will then learn to repeat or vary them. This can be done on the piano by transposing the materials into different keys, playing them on different registers, and playing the materials with different tempi and dynamics. Imitation is heavily involved at this stage where the child learns through recall and response to stimulate an interactive atmosphere.

3.11.4 Strategies at Level 5

At Level 5, the children have a growing recognition of structure at the level of the whole piece of music, of frameworks in the domains of relative pitch and time such as

modes and tempi, and of transition probabilities between notes. The children at this level should be exposed to listening to a wide range of repertoires on the piano, potentially of increasing length and complexity, to develop preferences. The pieces can be labelled verbally or through other means so that the child can refer to them in future choice-making. In the proactive domain, the child is taught to learn short and simple pieces on the piano with increasing length and complexity over time. The strategies then allow the teacher to support the child's learning by dividing the materials into several sections and teaching them by ear or visual demonstration. At this stage, the technique of playing is introduced to the child. As the growing length and complexity of the repertoires increases, one needs to learn a certain method of playing to fulfil musical aims. However, matters of technique are likely to present a particular challenge as some of the children may have physical disabilities. Therefore, with this in mind, the development of technique will be modified to the child's physicality.

In terms of the interactive domain, the child will be given the opportunity to play not just with the teacher but also to extend their involvement with other peers. This in turn helps children with ASC, who are regarded as having difficulties in social interactions, to develop skills in interacting with others when verbal interaction is impossible. By using music, the child can engage in 'proto conversations', meaningful exchanges that transmit a message understood by both parties without involving elaborate signage. Playing the piano with others can also contribute to 'developing cognisance of a sentient with the "other" out there' (Ockelford, 2013).

After identifying the elements and the possible strategies for each music-developmental Level, a draft piano framework with detailed strategies was produced (see Table 8), which was then trialled on each case study.

Table 8. Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 1 of 20.

SoI Element	Sounds of Intent Descriptor	Piano Pedagogical Context	Pupil's Engagement	Strategies Code / Teacher's Input	Anticipated Learning	Success Criteria
R.2.A	Shows an awareness of sounds – potentially an increasing variety	In this context, the piano will not be used in the conventional way, by which the teacher teaches the child to play the piano. Instead, the piano is used as a resource tool for making a range of sounds. It acts as a percussive instrument which the teacher uses to show the variety of sounds that it is possible to achieve on the piano. This assists the child to explore the various sound textures. The child will not approach the piano and might not listen to it in the conventional way. The child may wander off, put their hands on the soundboard to feel the vibration, or put their ear to the piano to listen to the sound. The teacher may put the child's hand on hers while playing, to feel the movement.	The child listens.	**R.2.A.1** The teacher demonstrates making a range of sounds and playing short pieces on the piano.	The child comes to appreciate that the piano is capable of making sounds.	The child reacts to sounds made on the piano, e.g. Through facial expressions (smile, vocalise, laugh etc)
R.2.B	Makes differentiated responses to qualities of sounds that differ (e.g. loud/quiet) and/or change (e.g. get louder)		The child listens.	**R.2.B.1** The teacher plays short pieces on the piano with variety of dynamics.	The child comes to appreciate that the piano is capable of making different range of sound qualities.	The child reacts to the different quality of sounds that is made on the piano.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 2 of 20.

P.2.A	Make sounds intentionally, potentially through increasing variety of means and with greater range of control.	The piano is used as a basis for the child to explore a variety of sound textures, such as the difference between pressing an individual note and a cluster of notes. The piano is used as a sensory means for the child to explore the range of sounds they can make by playing the piano in different ways, such as striking the keys, pressing them down using one finger/several fingers/palm/arm/elbow, or hammering the keys. The teacher can then expand this by exploring how different touches on the keys will produce different sounds.	The child presses down the keys with various touch supported by the teacher with physical prompt. The child presses down individual notes and cluster of notes.	**P.2.A.1** The teacher supports the child hands over hand/ hand under hand to press down the keys with various touches (gently, soft, loud, strike the keys, hammering the keys and etc.)	The child comes to appreciate that different physical actions will produce different quality of sound.	The child produces sound without physical prompt.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 3 of 20.

I.2.A	Sounds made by another stimulate a response in sound.	The piano is used as resource to make a variety of sounds with the aim of generating responses from the child, which in turn leads to interactive play with the teacher. The child may respond in different ways, such as using their facial expressions, body language, or vocalising.	The child is allowed ample time given time to respond to the teacher's playing. Similar to call and response.	**I.2.A.1** The teacher plays on the piano and allows ample time for the child to respond.	The child learns interaction, taking turns in playing the piano.	The child is able to respond to the sound made by the teacher through different ways of playing (banging on the piano, pressing down the keys, knocking the keys etc.)

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 4 of 20.

R.3.A	Recognises and responds to the repetition of sounds	The piano is used to create patterns. The design of the piano, with its immediacy and consistency of sound, provides a particularly useful medium for direct repetition, and enables the child to recognise simple patterns that can be produced on the piano. This can be done through using sounds (pitches) or rhythmic patterns produced from the piano.	The child engages with a repeated sound that produced by the teacher. The sound may form a regular beat.	**R.3.A.1** The teacher starts to elicit responses from the child by playing sounds for which the child has previously shown a preference. This can be a particular note on the piano, or a cluster or notes, a chord. Once the child responds to the repetition in relation to the sounds of a particular quality, teacher may try to extend to other sounds, for example made by playing at different tempi, in different register at different dynamics.	The child engages with a repeated sound that produced by the teacher. The sound may form a regular beat although may need not. This may lead the child to produce the sound through imitation.	The child comes to recognise structures in sound and is able to detect patterns in sound, potentially of various types.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 5 of 20.

P.3.A	Intentionally makes simple patterns through repetition	The child starts to learn basic pitches on the piano and the geographical design of the piano (groups of two black keys and three black keys; and after every seven white keys, the pattern repeats itself.) In order to enhance their recognition and to assist the child to remember, letters are attached to the keys to provide visual cues for the child. At this stage, no piano technique is involved; the piano is used as a resource to assist the child in recognising simple patterns on the piano. Recognising patterns is important in music making, as music (repertoire) is made up of patterns.	The child creates simple patterns (repeated notes) on the piano with the help of the teacher. The child creates simple patterns, same note up and down all octaves of the piano with the help of the teacher.	**P.3.A.1** The teacher supports the child hand over hand/ hand under hand to repeat notes. **P.3.A.2** The teacher supports the child hand over hand / hand under hand to repeat notes up and down all octaves of the piano.	The child comes to appreciate that the same physical action will produce the same pitch.	The child creates simple patterns without physical prompt.

Table 8 Piano Curricular Framework (Strategies to be implemented by the researcher) 6 of 20.

P.3.B	Intentionally makes simple patterns through a regular beat.	The child learns that with the same physical action (striking/playing the keys), they can form a regular beat on the piano.	Prompt by the teacher, the child plays simple patterns (repeated notes) on a regular beat.	**P.3.B.1** The teacher supports the child hand over hand/ hand under hand to repeat the notes with regular beat with counting.	The child comes to appreciate that music is made up of pattern such as regular beat.	The child plays the piano creating simple patterns through a regular beat.
P.3.C	Intentionally makes simple patterns through regular change.	Once the child has learnt that simple patterns (repeated) can be formed on the piano, the teacher can start introducing how regular changes can be achieved on the piano using patterns.	The child learns to play repeated ascending and descending pattern of notes (C, D, E, F, G, G, F, E, D, C) with regular changes such as playing in different registers and playing in different keys and play with alternate hands.	**P.3.C.1** The teacher supports the child hand over hand / hand under hand to repeat ascending and descending pattern of notes (C, D, E, F, G, G, F, E, D, C) with regular changes by playing in different registers, playing in different keys and play with alternate hands.	The child comes to appreciate that music can make simple patterns through regular changes.	The child is able to play different patterns without the help from the teacher.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 7 of 20.

I.3.B	Imitates the sounds made by another.	The piano can clearly illustrate the cause–effect relation: pressing a key will always have the same effect. Thus, the piano is used as an instrument to initiate 'call and response' activities: the child learns to imitate simple patterns played by the teacher.	The child learns to copy the teacher's playing (short musical patterns), starts through physical prompting.	**I.3.B.1** The teacher supports the child by allowing time to copy the teacher's playing through physical prompting.	The child learns to copy musical patterns. Enhance short-term memory.	The child is able to copy the teacher's playing without physical prompt.
I.3.C	Recognises own patterns in sound being imitated	Here, the teacher is seeking initiation from the child. Ideally, the teacher will become involved in the process of imitating the simple sounds produced by the child, to see if the child recognises that their own patterns of sound are being imitated.	Direct the child to play a musical pattern on the piano, the teacher copies and pauses to see if the child notices that her playing has been imitated.	**I.3.C.1** The teacher deliberately imitates what the child has played and pauses to see if she notices that her playing has been imitated.	The child learns interaction through music making.	The child is able to recognise own patterns being imitated.

Table 8 Piano Curricular framework (Strategies to be implemented by the teacher in this study) 8 of 20.

I.3.D	Imitates simple patterns in sound made by another (through repetition, regularity and/or regular change)	The imitation between the teacher and the child continues; however, one should note that shared attention is a significant notion here. The attention of the teacher and the child should be attuned to each other, so that they can alternate their roles: the teacher demonstrates while the child imitates, or vice versa.	The child imitates simple patterns played by the teacher with regular changes such as playing in different registers and in different keys. The child plays simple patterns for the teacher to imitate with regular changes and/or repetitions.	**I.3.D.1** The teacher plays simple patterns for the child to imitate. The teacher may play accompaniment while the child is imitating the pattern. **I.3.D.2** The teacher imitates simple patterns played by the child, deliberate change patterns to see if the child is able to recognise the changes.	The child learns interaction and recognises changes in pattern.	The child is able to imitate the teacher's playing without physical prompting. The child is able to play the simple repetitive patterns without being distracted by the accompaniment. The child is able to make repetitive patterns through regular changes with accompaniment by the teacher.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 9 of 20.

R.4.A	Recognises and responses to musical motifs being repeated or varied.	The child starts to learn to play short motifs on the piano. Again, the piano is not taught in the conventional way, by which techniques are dealt with first. Instead, music making is the priority: the teacher focuses on creating simple musical motifs for the child to listen to and enjoy.	The child listens. The teacher is hoping to seek responses from the child. The child may wander off or show recognition/responses through facial expressions, body language etc.	**R.4.A.1** The teacher shows how motifs can be related (through repetition and variation) through 'call and response' activities, making the relationships as clear as possible, with a range of different materials such as a short phrase of a tune, a short chorus of songs etc.	The child recognises musical motifs being repeated or varied. The child recognises a chunk of music being repeated or varied.	The child comes to be aware of musical motifs being repeated or varied through responses such as body language, facial expressions or vocalisation etc.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 10 of 20.

P.4.A	Creates distinctive groups of musical motifs	The child then continues to learn by creating groups of musical motifs on the piano. As mentioned above, music making should be prioritised; however, once the child is familiar with the materials, the teacher can then start introducing simple techniques to play these materials.	The child learns to imitate rhythmic motifs through clapping. This will then transfer onto playing them on the piano.	**P.4.A.1** The teacher introduces rhythmic motif s by clapping. **P.4.A.2** The teacher supports the child to play rhythmic motifs on the piano.	The child comes to appreciate that music is made up by motifs.	The child is able to remember different groups of musical motifs and able to clap and play the musical motifs without the help of the teacher.
P.4.B	Links musical motifs by repeating or varying them.		The child learns to play motifs through repetitions and also variations.	**P.4.B.1** The teacher supports the child to learn musical motifs through repetition. **P.4.B.2** Varying the motifs through different means such as playing in different register, playing with different dynamics and articulations.	The child comes to appreciate that music can be transposed and be played in different keys. The child comes to appreciate that motif can be varied through different ways.	The child is able to play different musical motifs through repetitions and also varying them in a number of ways.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 11 of 20.

I.4.A	Produces musical motifs in the expectation that they will stimulate a coherent response.	The piano is used for joint attention activities such as call and response. At this stage, the teacher is not seeking a direct imitation from the child; instead, she seeks responses from the child by playing half of the motif. The child may respond through facial expressions, body language (pulling the teacher's hand towards the piano as an indication to continue) or vocalisation. The child may also respond by completing the rest of the motif.	The child plays a set of musical motifs; the teacher will imitate in return and/or complete the rest of the repertoire.	**I.4.A.1** Teacher imitates the musical motif played by the child and/or completes the rest of the repertoire.	The child comes to appreciate that music making can be interactive through activities such as 'call and response'.	The child produces musical motifs in expectation that they will stimulate a coherent response.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 12 of 20.

I.4.B	Imitates distinctive groups of musical sounds – 'motifs' – made by others.	The piano is used for 'call and response' music making. At this stage, the child is learning to imitate the teacher. The child learns through demonstration and listening, instead of reading notation.	The child copies the teacher's playing through listening.	**I.4.B.1** The teacher plays motifs on the piano with several pauses for students to imitate in return.	The child learns longer repertoire by introducing motifs with pauses. Enhance attention skill and listening skill.	The child is able to imitate distinctive groups of musical motifs.
I.4.C	Responds to others by using different musical motifs coherently.	The teacher is seeking responses from the child, or recognition of the different motifs that are linked together.	The child completes motifs with the help of physical prompt from the teacher.	**I.4.C.1** The teacher deliberately plays incomplete motifs with pauses for students to complete the rest.	The child learns to listen attentively and responds to other's playing.	The child is able to complete the musical motifs played by the teacher without physical prompt.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 13 of 20.

I.4.D	Interactions form coherent patterns of turn taking, with the possibility of some simultaneity.	This element corresponds with level 5, or is approaching level 5: the child is now learning to play the piano with extended materials, which leads towards playing simultaneously with the teacher.	The child plays a short piece with the teacher. This can be done through physical prompts (e.g. counting beats before starting). The child plays the piece with turn-takings with the teacher. The child is supported by the teacher to play a simple bass line on the left hand while playing motif at the same time.	**I.4.D.1** The teacher supports the child to play simultaneously with the teacher. **I.4.D.2** The teacher plays a piece and prompts the child to take over and then back to the teacher again. **I.4.D.3** The teacher supports the child to play motifs on one hand with simple bass line on the other.	The child learns turn-taking, with the possibility of some simultaneity. The child learns about hands coordination.	The child is able to pick up the phrase and play simultaneously with the teacher. The child is able to play motif on one hand with simple bass line without support from the teacher. The child is able to play pieces through turn-taking with the teacher.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 14 of 20.

R.5.A	Attends to whole pieces of music, becoming familiar with an increasing number and developing preferences.	The child is given opportunities to listen to various genres of repertoire. The teacher will start with songs that the child is familiar with, such as nursery rhymes, pop music, classical music or jazz. The teacher is seeking growing concentration from the child, whereby they are able to listen attentively throughout the entire repertoire or several repertoires.	The child listens. The teacher is seeking growing concentration from the child where he/she is able to listen attentively throughout the entire repertoire or several repertoires.	**R.5.A.1** The teacher starts with songs or pieces that the child listens at home or school and then seek to extend the child's experience through exposure to wider repertoire, potentially incorporating pieces of growing length and complexity. **R.5.A.2** The teacher labels the pieces verbally or through other means, such as PECS, so they can be referred to in future choice-making.	The child is given the opportunity to listen to a broad repertoire of pieces. The child may become familiar with an increasing number of different pieces and develop preferences.	The child listens to an increasing number of pieces all the way through and develop preferences.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 15 of 20.

R.5.B	Recognises prominent structural features (such as the choruses of songs)	The teacher may deliberately play choruses or prominent features from the repertoires that the child is familiar with, to seek responses from the child.	The child listens to a wide variety of repertoires.	**R.5.B.1** The teacher plays repertoire consistently to facilitate recognition. **R.5.B.2** The teacher engages with the child through singing and potentially playing.	The child becomes familiar with the prominent feature of repertoire of pieces (e.g. Choruses of songs). The child develops preferences.	The child responds to the prominent features through different means (e.g. facial expressions, verbally, singing etc.)
P.5.A	Perform short and simple pieces of music, potentially of growing length and complexity, increasingly 'in time'.	The child is introduced to playing a full repertoire on the piano through demonstration or listening. Notation is not introduced at this stage. The materials are divided into smaller parts, to help the child to memorise the repertoire.	The child learns new materials by ear. The child plays pieces from memory that is taught previously.	**P.5.A.1** The teacher supports the child to perform short and simple pieces of music. **P.5.A.2** The teacher supports the child to learn longer repertoires by ear with several pauses to imitate in return. Materials will be divided into several sections to be introduced to the child to learn.	The child learns to perform short pieces, potentially of growing length and complexity. Enhance memory skills.	The child is able to perform short pieces that have learnt previously without the help of the teacher. The child is able to play in time. The child is able to learn new repertoires through listening.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 16 of 20.

P.5.B	Intentionally improvises on familiar pieces, varying the original material in simple ways.	In this element, the child learns that materials can be varied in different ways, and learns the techniques used to achieve this.	The child listens to the teacher improvises on familiar pieces. The child is then encouraged to copy the same and improvise their own. The child is encouraged to play together with the teacher.	**P.5.B.1** The teacher supports the child to improvise on short pieces that have learnt previously into varied ways such as ornamenting the melody into various keys.	The child learns to improvise on original material.	The child is able to improvise on short pieces without the help of the teacher.
P.5.C	Creates short and simple pieces of music, potentially of increasing length, complexity and coherence, whose general characteristics may be intended to convey particular moods or feelings, and which may be linked to external associations.	The child starts to learn, using ideas from the repertoire that they know, and will use their imagination to create their own composition on the piano. The teacher will provide guidance throughout.	The child learns about ideas from songs that they have known. The child creates sounds on the piano to portray certain characters, specific emotional intention etc.	**P.5.C.1** The teacher supports the child to compose short simple pieces by suggesting ideas. Teach about sounds that can be made from the piano to portray certain characters, moods and emotional intention.	The child learns to create new short pieces using ideas from songs that he/she has known.	The child is able to create and compose short pieces, potentially of increasing length, complexity and coherence.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 17 of 20.

P.5.D	Has the physical capacity to produce short and simple pieces of music, potentially evolving to meet the needs of material of growing complexity and length.	The child learns piano techniques (execution of fingers, learning to play with good support of both arms and hands). The child also starts learning simple musical concepts.	The child works on techniques such as learning coordination of hands by playing hands together for different repertoires. The child learns to playing major and minor scales with both hands and alternating hands. The child is given different exercises to be played on the piano, e.g. Hanon.	**P.5.D.1** The teacher supports the child to play more complex pieces with two hands. **P.5.D.2** The teacher supports the child to learn playing scales with two hands/ alternating hands and other techniques.	The child learns advanced techniques in order to play more advanced pieces.	The child is able to play more advanced pieces with both hands. The child is able to master most of the techniques. Good memory skills.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 18 of 20.

I.5.A	Perform simple pieces simultaneously with others, sharing a common part.	Ensemble skill is important in music making. It is an essential skill for a musician to be able to play in time and in tune with other musicians. In this element, the child learns to develop ensemble skills through performing or playing simultaneously with others. Through this method, the child will learn to interact with others through music. This skill is first introduced by playing a common part with the teacher; this will assist the child to become familiar with the skill of playing in time with others.	Two children play same repertoire together. The children are introduced to simple duet skill and have enjoyment in playing with peers.	**I.5.A.1** The teacher supports the child to play simultaneously with others, introducing ensemble skill.	The child develops ensemble skill to perform simple pieces with peers.	The child is able to perform simultaneously with others, sharing a common part.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 19 of 20.

I.5.B	Perform with others, using increasingly developed ensemble skills and maintaining and independent part.	Having accomplished the above, the child is then introduced to playing with others by maintaining his/her own independent part. As this is a challenging skill, the teacher may start by playing a common part with the child while providing simple accompaniment at the same time, before letting the child play his/her own part completely.	The child plays an entire piece with teacher playing accompaniment or second part of the duet.	**I.5.B.1** The teacher provides support such as left hand accompaniment while the child is playing right hand melody. **I.5.B.2** The teacher plays the secondo part of the duet with the child.	The child develops ensemble skill and ability to perform with others.	The child is able to perform together with the teacher.

Table 8 Piano Curricular Framework (Strategies to be implemented by the teacher in this study) 20 of 20.

I.5.C	Improvises with others, repeating, varying and/or building on the material that is offered in simple ways.	At this point, the child has already been introduced to playing a wide variety of repertoires and is comfortable playing with others. He/she can start improvising on their own independent parts while the teacher provides accompaniment.	The child is encouraged to improvise on materials that have learned and playing together with the teacher.	**I.5.C.1** The teacher provides support such as accompaniment for the child while improvising together.	The child develops improvisation and ensemble skill at the same time.	The child is able to improvise materials together with the teacher.
I.5.D	Improvises with others and offers material for them to use. Joins other ensemble group.	The child has developed good musical skills that allow him/her to improvise and play in an ensemble group.	The child is introduced to play with other instruments such as violin, cello, flute and etc to expose vast variety of ensemble experiences.	**I.5.D.1** The teacher provides support for the child to play in an ensemble group with other instruments.	The child develops ensemble skill and confidence in playing with others independently. The child develops good listening skill by playing with others.	The child is confident in playing with others in ensemble group.

3.12 Video recording and analysis

Observations were made through the use of video recordings. This is a valuable method for collecting and analysing data due to its advantage of allowing me to review the recordings several times after the session at any pace and to repeat viewing if necessary (Asan & Montague, 2014). It also provides the chance to capture behaviours of the child that I might have missed during the sessions. I was aware that using a video camera might be obtrusive and affect the participant's behaviour (Russell, 2007). Therefore, care was taken to position the camera to minimise its influence. One of the cameras was mounted on a tripod and positioned at the side of the piano and at a distance so that it was less visible to the children but still able to capture the images clearly. A second was mounted on the piano with a flexible camera clamp so that it captured only the hand movements on the piano. This was for the children who had not consented not to being filmed with facial recognition that will be identifiable.

The research involved continuous interplay between data collection and data analysis. I started analysing data following the first filming to begin identifying patterns and to facilitate subsequent data collection. Before the beginning of the research, a list of strategies was drafted for each musical development level to be trialled in the lessons. After each lesson, I reviewed the strategies implemented. The purpose of the review was based on Schön's (1991) model of 'reflection in action' and 'reflection on action' where I reflect on my teaching practices. This is to help in testing the effectiveness of the strategy and what could be improved or modified if a strategy was unsuccessful. Each session is tailored to the child's learning style and their capability.

The session and the implementation of the strategies are based on the notion of 'capability' (Terzi, 2005). Capabilities are the opportunities and freedom to achieve valued functioning (see Section 2.11). Each session is the celebration of each child's

individual musical journey. It is a 'celebration of difference' through which the concept of disability is positively recognised, rather than stigmatised (Terzi, 2005; Corker, 1999). During the process of analysis, it became clear that several strategies were implemented within one element to suit the learning style of different children to accomplish the same anticipated learning. To present the emerging strategies in the study systematically, I adopted a coding system to label and categorise them. I used focused coding which through a constant comparison process, and codes were grouped based on similarities which results in a set of focused codes (Charmaz, 2006). For instance, the anticipated learning of the SoI Level 2 reactive element is that the child comes to appreciate that the piano is capable of making sounds. To achieve this, one of the strategies was the teacher demonstrated making sounds and playing songs on the piano for the child to listen to. Another was that the teacher adopted some common strategies that have been used on children with ASC and PMLD such as the hand-under-hand technique using kinaesthetic input to assist the child in understanding output of the sound. The details of each strategy are presented in Chapter 4 to 7).

After data collection, open observations were carried out to establish criteria and variables to be used later to code the videos using systematic observation (Noldus, Trienes, Hendriksen, Jansen & Jansen, 2000). The aim of the initial open observation was to search for dominant behaviours of each child to derive the main themes and variables for further analysis. The dominant behaviours of each child were catalogued and a list of predefined behavioural codes was produced (see Table 9). To ensure reliability, three external verifiers were asked to look through random sections from the video recorded sessions and cross check the list of predefined behavioural codes to ensure the descriptors were compatible with the behaviours seen in the videos.

Table 9. List of behavioural codes

Reactive	
Codes	**Behaviours**
0	No apparent reactions: no physical response or emotional response
1	Wanders off
2	Lies on the floor
3	Looks around
4	Interrupts the teacher with talking
5	Plays with other objects
6	Makes eye contact with the teacher
7	Looks at the piano keys
8	Looks at the music scores
9	Smiles
10	Vocalises
11	Moves with music - Rocks back and forth / side to side / circular movement
12	Knocks on the piano
13	Flaps hand
14	Covers ears
15	Pushes the teacher away from the piano
	Pushes the teacher's hand away from the piano
	Shakes off the teacher's hand
16	Moves around the piano
17	Sits still and listens attentively
18	Cries
19	Tolerates putting the hand on top of the teachers (hand-under-hand)
20	Leans on the piano to listen
21	Reluctant to engage on the task
22	Expresses verbally dislike of the song
Proactive	
Codes	**Behaviours (with support – physical support such as holding the hands, visual prompt such as pointing to the key)**
23	Glissando (Glide on the piano keys)
24	Bangs on the piano – with palms / arms / elbows
25	Tolerates the teacher holds the hand to press the keys (individual fingers / palms)
26	Presses the keys with all fingers / palms / fist (without support)
27	Plays the keys with individual fingers (without support) – no patterns detected, not repeated notes, not motifs
28	Control teacher's hand by pushing her hand down to play the keys
29	Control teacher's hand movement to play the keys (lift up and down)
30	Presses the pedal

31	Plays repeated notes (with support)
32	Plays repeated notes (without support)
33	Plays repeated notes with changes (different registers)
34	Plays simple patterns (two black keys/three black keys up and down all octaves of piano)(with support)
35	Plays simple patterns (two black keys up and down all octaves)(without support)
36	Plays notes with the same name up and down all octaves of the piano (with support)
37	Plays notes with the same name up and down all octaves of the piano (without support)
38	Plays same chord up and down all octaves of the piano (with support)
39	Plays same chord up and down all octaves of the piano (without support)
40	Plays ascending and descending pattern of notes (with support)
41	Plays ascending and descending pattern of notes (without support)
42	Plays with regular beat
43	Plays short motifs (with support)
44	Plays short motifs (without support)
45	Plays short motifs with variation (in different registers, in octaves, in thirds)
46	Plays a full repertoire
47	Reads simple notation
48	Plays left-hand accompaniment with support
49	Plays left-hand accompaniment without support
50	Plays with both hands together
51	Transposes the melody
52	Improvises on given materials by ornamenting the melody
53	Sings
Interactive	
Codes	**Behaviours**
54	Controls teacher's hand by pushing her hand down to play the keys
55	Controls teacher's hand movement to play the keys (lift up and down)
56	Initiates contact with the teacher by pulling/pushing the teacher's hand towards the piano
57	Initiates contact with the teacher by pushing the teacher's hand towards the sound he/she desires
58	Imitates approximate (only 50% or less of the materials is imitated correctly)
59	Imitates patterns (single note, repeated note, ascending pattern of notes, descending pattern of notes)
60	Plays simultaneously with the teacher (random keys, no imitation)

61	Initiates interaction by playing a pattern and pauses for the teacher to imitate
62	Complete the pattern (ascending or descending pattern of notes)(with support)
63	Completes the pattern (ascending or descending pattern of notes)(without support)
64	Imitates short motifs
65	Imitates short motifsin changes (different registers)
66	Completes incomplete motifs (with support)
67	Completes incomplete motifs (without support)
68	Plays short piece through imitation
69	Plays short piece simultaneously with the teacher sharing common part
70	Plays short piece with the teacher maintaining independent part while the teacher plays accompaniment
71	Takes turn with the teacher

After the list of behavioural codes was first generated, the list was too confusing and, with 71 variables, was too cumbersome and time-consuming for me and external coders to use. Therefore, a new coding criterion was established with the use of a simple binary measure of 'on task' and 'off task' with the addition of a 'non-committed'/'unsure' to gauge the efficacy of the strategies and to record these behaviours in seconds.

The first stage of open observations was to focus on finding dominant behaviours in participants during the implementation of the strategy which then allowed me to narrow down the list and identify three main variables for further analysis. Coolican (2017) suggests that systematic observation allows the researcher to collect numerical data to compare patterns of behaviours and trends. To arrive at this stage, the categories and the coding system need to be defined in advance. For the purpose of this study, the new three variables were defined as follows:

a) On task – child was engaged on the task given.

i) Child's attention is directed towards the teacher

Examples:

- Watches what the teacher is doing
- Places hands on teacher's to feel what she is doing
- Appears to be listening carefully to what the teacher is playing.

ii) Engages in the strategies / involves purposefully with the strategies

Examples:

- Moves when the teacher plays the piano (either in time or not)
- Tolerates teacher to guide in playing
- Sings when teacher is playing
- Plays piano making large movements (arms, fists, palms)
- Plays piano making small movements
- Plays/creates patterns on the piano
- Plays/creates motifs
- Plays short repertoire on the piano (single/both hands)
- Transposes or improvises short repertoire
- Makes sounds on the piano and waits for response or vice versa (no imitation)
- Imitates the teacher's patterns
- Imitates motifs
- Takes turn in imitation with the teacher
- Takes turn in completing patterns/motifs/repertoire with the teacher
- Plays simultaneously with the teacher sharing common part or maintaining independent part.

b) Off task – child was not engaged on the task given / disrupted the task.

i) Music has no impact on attention / movements

Examples:

- Looks at nothing in particular (does not attend)
- Does not show interest or appear to be attending to what the teacher is playing
- Moves away from the piano/keyboard when it is played

ii) Disengaged in the strategies / disrupts the strategies

Examples:

- Does not appear to be engaging in the strategy
- Prevents researcher's guidance
- Plays random keys / makes random sounds on the piano when instructed to play certain patterns / motifs / repertoire.
- Disrupts the lesson by switching off the keyboard / pulls out the plug
- Refuses to engage through crying / expresses verbally
- Plays with other objects such as the controller buttons of the keyboard.

c) Unsure – behaviours that could not be clearly defined as engaged or disengaged on task given. It was difficult to determine if some of the behaviours listed are common behavioural trait of children with ASC or they were reacting to the strategies.

Examples:

- Flaps hands
- Covers ears

- Vocalisation
- Knocks on the piano

All data were recorded and the percentage of time during which the participants were on task, off task and 'unsure' was calculated. Comparison between each child within the same strategy was also carried out by calculating the average percentage of their engagement as the attendance of each child and the length of the session varied (see Chapter 4). A sample of the coding sheet is shown in Figure 5.

Child	Session	Level	Reactive	Proactive	Interactive	Elements	Strategies	Time (s)	On task	Off task	Unsure
1	1	2	R			A	2	1	1	0	0
1	1	2	R			A	2	2	1	0	0
1	1	2	R			A	2	3	1	0	0
1	1	2	R			A	2	4	1	0	0
1	1	2	R			A	2	5	1	0	0
1	1	2	R			A	2	6	1	0	0
1	1	2	R			A	2	7	1	0	0
1	1	2	R			A	2	8	1	0	0
1	1	2	R			A	2	9	1	0	0
1	1	2	R			A	2	10	1	0	0
1	1	2	R			A	2	11	1	0	0
1	1	2	R			A	2	12	1	0	0
1	1	2	R			A	2	13	1	0	0
1	1	2	R			A	2	14	1	0	0
1	1	2	R			A	2	15	1	0	0
1	1	2	R			A	2	16	1	0	0
1	1	2	R			A	2	17	1	0	0
1	1	2	R			A	1	18	0	1	0
1	1	2	R			A	1	19	0	1	0
1	1	2	R			A	1	20	0	1	0
1	1	2	R			A	1	21	0	1	0
1	1	2	R			A	1	22	0	1	0
1	1	2	R			A	1	23	0	1	0
1	1	2	R			A	1	24	0	1	0
1	1	2	R			A	1	25	0	1	0
1	1	2	R			A	1	26	0	1	0
1	1	2	R			A	1	27	0	1	0

Figure 5. A sample of the coding sheet of Child 1 session 1

To increase reliability and validity, two external coders coded 10% of the videos which and rated a subset of observations while I rated the remainder. An inter-rater reliability analysis using SPSS was performed to determine consistency. In addition, I mapped the musical engagement and consistency that she observed onto the SoI software gauging the progress of musical development of each child.

3.13 Interrater reliability

Reliability was achieved through using two-way mixed, consistency, average-measures intraclass correlation coefficient (ICC) (Weir, 2005) to check consistency in

rating between me and the two external coders. Two-way mixed, consistency average-measures were used to assess the scores from myself and the two coders. This was because there were the same raters for all ratees, and three coders participated in this project. I was interested in finding the consistency among the three raters, but was interested in the mean of the scores rather than a single rater.

The results of the ICC showed excellent consistency of ratings on the engagement of the children, at ICC=0.97. This indicates that coders had a high degree of agreement and suggests that engagement was rated similarly across the two coders. The high ICC suggests that a minimal amount of measurement error was introduced by the independent coders, and therefore statistical power for subsequent analyses is not substantially reduced.

3.14 Interpretative phenomenological analysis (IPA)

The results from the quantitative analysis was then subject to detailed interpretative phenomenological analysis (IPA). IPA was chosen as it focuses on lived experiences at its centre which reflects the aim and purpose of this research (Smith, Flowers & Larkin, 2009). Phenomenology is concerned with exploring individual human experiences and recognises that there are many factors which affect people's perceptions of reality and therefore the phenomenon and overall experience (Eatough & Smith, 2008; Smith & Dunworth, 2003). The aim of the research is to determine the most effective strategies at different music-developmental levels and while quantitative analysis was able to measure the engagement of the children, it was important to understand the content and the complexity of those engagements and disengagements. This involved me to engage in an interpretative relationship with transcribing the engagements and disengagements. Most of the children participated were non-verbal or with limited verbal ability, and to understand why they behave in

such a way the most appropriate analysis was through IPA.

IPA's focus is on 'people's understanding of their experiences' (Smith et al., 2009, p.47) which can only be accessed through interpretation of these experiences. It is underpinned and influenced by hermeneutics, also known as the theory of interpretation. The interpretation is seen as a dynamic process in which I take an 'active role' (Smith, 2009, p.4) and employ a 'range of skills, including intuition' (Smith & Eatough, 2007, p.36). This corresponds with my active role as the teacher in conducting the sessions. The main focus was on transcribing the sessions from the videos. Smith et al. (2009) provide a step-by-step description of an IPA analytic process and this study employed those ideas and those of Smith and Eatough (2007) but maintained flexibility within the analytic process.

The process of analysis was divided into two steps. First, analysis was focused on each individual participant. Fourteen participants and their sessions were transcribed individually. As most of the participants were non-verbal or did not engage in conversations during the sessions, it was their behaviours that were transcribed. A sample of the transcription is provided below:

Table 10. Sample of transcription of Child 1's session

Sessions/ Durations	Strategies	Researcher's actions	Child's reactions	Interpretations
1 17 seconds	R.2.A.2	I use hand-under-hand technique to support the child to feel the movement of the hand playing on the piano. I play *Five Little Monkeys.*	The child is neither looking at me nor the piano. She seems to be distracted looking around the room. She is chewing on her toy as well. Her hand only lasted 3 seconds on my hand and then she pulls her hand away. After 17 seconds into the song, the child wanders off from the piano.	The child is encountering the sound. However, it is unclear whether the child is attending to the sound. There are no clear physical or emotional evidences suggested that. She is however, tolerating the input and physical sensation from the movement of the arms.
3.42 minutes	R.2.A.2	I make an attempt to get Child 1 back to the piano however it is not successful.	The child is lying on the floor and reluctant to get up. She is chewing on her chewing toy. She gets upset when I try to get her up from the floor.	
7.45 minutes	R.2.A.1	I provide a wide range of listening experiences for the child. First, I play the child's favourite nursery songs to motivate the child. The songs are: *Let it Go, Five Little Monkeys, If You're Happy and You Know It, Twinkle Twinkle Little Star, Bonnie Lies Over the Ocean.* I stopped for 4-5 seconds in between songs to see if the child reacted.	Throughout the event, child 1 lies on the floor and chews on her toy. No physical or emotional evidences are observed.	Although the child may not seem to be engaging, she may be listening unconventionally (internalising the sound while she was lying on the floor), as discussed by Bogdashina (2003), some children with ASC use the preconscious (indirect) system to take in information which they use their senses peripherally. This allows them to take in a great amount of information though they themselves are 'absent' from the

		I then make a series of sound. First, rapid high register notes to portray bird-chirping sound to stimulate the child. And then I play low register rapid notes to portray 'thunder' sound to contrast the previous sound. I continue to play individual notes on the piano. First slow individual ascending white keys note and then descending white keys followed by ascending black notes and then descending black notes that contributed to pentatonic scale. These sounds were made in order to provide a wide range of sounds for the child to experience and in hope that the child will react to one of these sounds.		process. For instance, the child does not seem to be listening, however she might be listening to the music indirectly.

One can see from the above (Table 10) that I transcribed what was happening while the strategy was being implemented. There was a column of interpretation to provide possible reasons of why the child was behaving in such a way. The behaviours were interpreted using cognitive autism theories, learning modalities of children with ASC, early years music development theories and the teacher's reflective thought process to establish factors affecting the child's engagement.

Once the initial analysis was complete, the second stage was to detect patterns across the cases to create emergent themes which reflect the experiences of the group as a whole and capture the quality of the participants who shared experience of the phenomenon under investigation (Willig, 2008). Data were analysed inductively to understand the meanings of the behaviour and experiences during the sessions. Here I explored the data by examining two aspects: factors affecting the children's learning and the teacher's thought process. According to Vygotsky (1978) and Rogoff (1990), human learning is a socially constructive process which involves the process of direct interaction with others (teachers or peers) or interaction with the ideas of others. The learning/teaching process requires the engagement of both parties; therefore, it is inevitable that there is a close relationship between the factors affecting the children's learning and the thought process behind the teacher's thinking. Pimenta (2002) argued that education is a complex phenomenon and a social practice performed by two or more people and that the actions and relationships between them can cause change. With this in mind, one could say that it is inevitable that the teacher's thought process will directly affect the engagement of the children, and vice versa. Therefore, I sought to examine the quality and nature of the interaction to offer a platform for systematic work in this area concerning children with ASC learning the piano and, ultimately, enable piano teachers and music practitioners to apply these strategies to promote musical skills at different music development Levels.

The first aspect, which concerns the factors affecting the children's engagement, is analysed by combining the thinking of autism theories (Baron-Cohen, 2002; Baron-Cohen et al., 2013; Frith, 1989; Happé & Frith, 2006; Hill, 2004; Jones et al., 2018; Bogdashina, 2016), which explain the core impairments in individuals with ASC from the cognitive perspective and the learning modalities that account for differences in

individuals' learning (Barbe & Swassing, 1979; Fleming, 2014; Willingham, Hughes & Dobolyi, 2015).

In respect of the second aspect, the teacher's thought process, the thinking behind the analysis is influenced by the combined thinking of Vygotsky's theory of the zone of proximal development (1978), Schön's reflective practitioner (1987/1991) and Clark and Peterson's teachers' thought processes (1986). Vygotsky (1978) described the zone of proximal development (ZPD) as 'the distance between the actual developmental as determined through problem-solving under adult guidance, or in collaboration with more capable peers' (p. 86). For Vygotsky, the teaching/learning process takes place within the ZPD, which is at a point that lies just above the learner's Level of competence: where the learner can operate successfully with the support of the teacher. Furthermore, the idea is explained further by Rogoff (1991), who stated that such a situation requires the learner's willingness to take risks, which involves self-belief in the capacity to engage, initiate and intentionally influence one's action; moreover, if the learners do not believe in their capability, they will disengage or resist the teacher's efforts.

To a certain extent, both Vygotsky's and Rogoff's ideas in the teaching/learning process are applicable to the implementation of the strategies in this project; for instance, the children require adult guidance at first before they are capable of creating the materials alone. However, these ideas fail to take into consideration the learner's level of functionality and cognitive development in a very early developmental stage, wherein they have no understanding of risks and self-belief. For children with ASC and learning difficulties, most have no recognition of what they are capable of doing and the core impairments drive their actions and engagement in a task. Therefore, one could not then account for disengagement being an action that is deliberately intended

by the child, as they do not believe in their capability. For children functioning at SoI Level 2, the functioning level is at a very early stage of developmental; therefore, even with adult guidance, the children may or may not be able to create the materials alone or to engage on a task given.

According to Clark and Peterson (1986), the thinking, planning and decision making of teachers contribute a large part of the psychological context of teaching and it is within this context that the subject and curriculum are interpreted and acted on. Therefore, it is important to understand the teacher's thought process, as it influences the student's learning achievement. Based on a model developed by Clark and Peterson (1986), the teacher's thought process is categorised into three fundamental types and here I use the model to describe the process involved in this particular research project: (1) teacher planning (I, as the teacher and researcher, identify the strategies before the sessions begin, and plan the music sessions in advance); (2) the teacher's thoughts and decisions (my thoughts and decisions during and after the session); and (3) the teacher's theories and beliefs (my knowledge of content related to the subject matter, pedagogy, curriculum, and how these relationships affect my planning, decisions and behaviours during the sessions).

This was then combined with Schön's model of 'reflection in action' and 'reflection on action' (1991), wherein I (the teacher and researcher) reflect on my teaching practices. Reflection in action refers to me acting on my feet during the sessions based on how the child reacts, and reflection on action refers to examining what has been done in the sessions and reflects on the actions taken and thinks about what could be done differently or improved upon in the next session. These two reflections are then combined with Driscoll's (2007) reflection framework based on three questions:

1. What? – Description of the event
2. So what? – Analysis of the event
3. Now what? – Proposed actions following the event

Below is a model of the researcher's thought process:

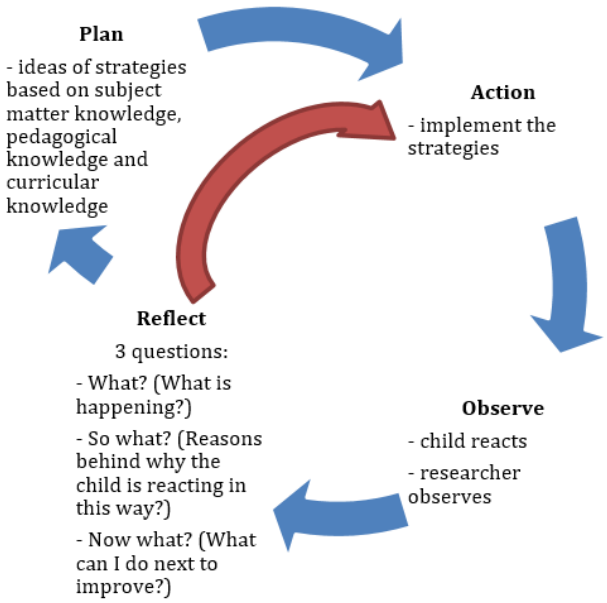


Figure 6. The researcher's thought process

The process is divided into two segments. The larger circle portrays the thought process after the music session, wherein I (the researcher) reflect on my overall practices and plans the strategies for the next session, whereas the smaller circle (action, observe and reflect) happens during the music session, in which I act spontaneously when the child reacts differently to the strategy. In this project, I referred the teacher's thought process to the researcher's thought process, as I am both the teacher and the researcher in this particular research project. I then grouped the results into different scenarios under each strategy implemented.

3.15 Credibility and trustworthiness

Qualitative research involves the researcher taking an active role in the collection and

interpretation of others' meaning making; the researcher's credibility and trustworthiness are therefore important. To increase the credibility and trustworthiness of the study's findings, various strategies were employed. A sound case study is significant and complete, uses alternative perspectives and sufficient evidence, and is reported in an engaging manner (Yin, 2011; Merriam, 2002). The case study data collection strategies that were adopted in this research project are as follows:

1. Rich description — rich and thick descriptions are provided to contextualise the study. It creates authenticity, which offers insights and illuminates the reader's understanding of the phenomenon under study.
2. Engagement — adequate time was allocated to data collection so that it became saturated. In this case, video filming was used to review and collect data that were initially missed during the sessions.
3. Reflexivity — critical self-reflection regarding assumptions, biases, and the relationship with the participants, which may have affected the investigation.
4. Triangulation — used three external investigators to confirm emerging behaviours to establish variables for coding the videos. Two external coders were involved in coding the videos and triangulated for reliability.

Chapter 4. Level 2 Results

4.1 Introduction

This research investigates the use of the piano as a tool for engaging children on the autism spectrum who have learning difficulties. The following research questions guided this study:

> Can the piano be used as a medium for engaging children on the autism spectrum who have learning difficulties in order to promote musical skills?
>
> Which strategies are appropriate for children at each of the four music development levels?

The findings of this study are based on a video analysis of the strategies, which were implemented on 14 participants across Levels 2, 3, 4 and 5 of the Sounds of Intent (SoI) musical development framework. This chapter and the following three chapters discuss the outcomes of strategies on each respective level. Quantitative results were derived from coding the videos for subsequent interpretative phenomenological analysis (IPA) to seek underlying patterns and trends. Graphs present the results alongside scenarios with interpretations of participant engagement. To measure the success of the strategies, I followed the success criteria as outlined in the piano framework (see Table 7).

4.2 Background of participants

4.2.1 Child 1

Child 1 is a Brazilian female who was six years old at the time of the study. She was diagnosed with ASC with global developmental delay and hypertonia and has recurrent viral-induced wheeze and glue ear. She needs to wear glasses due to vision

impairment; however, when she was participating in the piano lesson, she had not yet received her glasses at the time of her piano lesson. Child 1 communicates through gestures, vocalisations and body language. According to her class teacher, her main means of communication is crying, which she frequent does for long periods of time. Her teacher reported that she finds it difficult to sit down and participate in an activity. In addition, she requires much assistance to look at and focus on the object or hold different objects in her hands. She also struggles to engage in any play and exhibits little interest in her environment. She tends to explore objects by putting them in her mouth. She likes to chew on toys, books or any objects that are within her reach. She sometimes initiates contact with adults by approaching them and continuously tapping them with her fingers. Child 1 has been introduced to PECS phase 1, MAKATON and assistive technology to assist her in expressing her needs. Her music teacher provided a brief description regarding music:

> Child 1 is happy during her music lessons, especially if music involves movement. She likes to wander about in the class and sometimes struggles in the transition of rooms. She has wandered up to the piano during the music lessons while I was playing on the piano. She will interact with me if the teaching assistant encourages it. However, when she is distressed, she will start crying. She is more reactive in music.

4.2.2 Child 2

Child 2 is a Pakistani British male with ASC who was eight years old during the research. He is non-verbal and uses gestures, facial expressions and vocalisations to communicate. According to his class teacher, he requires one-to-one support in learning, although he can work independently on occasions. He can engage in a task for around five minutes and then quickly wanders off. In addition, he needs adult

support to maintain interest in a task. He is currently in PECS phase 2 and can use PECS effectively when prompted by the teaching assistant. He prefers to play individually but sometimes enjoys engaging with adults and is developing an ability to maintain eye contact with staff. The music teacher provided a brief musical description of the child's experience with music:

> Child 2 seems to be happy-go-lucky and chilled during music lessons. He is happy to explore new stuff, such as trying out percussions when given, but will quickly wander off. He is more reactive to music.

4.2.3 Child 3

Child 3 is a Black Caribbean male who was nine years old when the research was carried out. He was diagnosed with ASC along with behavioural difficulties and sensory needs. Child 3 is non-verbal and communicates with gestures, facial expressions and vocalisations. He sometimes uses PECS to communicate with the teaching assistant and is currently in PECS phase 2. Because of his behavioural issues, Child 3 requires one-to-one support. He occasionally attacks other students in the class or runs away; therefore, a teaching assistant must always be present to supervise his behaviour. Child 3 has been taught with structured teaching in the school. Accordingly, he follows a structured timetable and is able to complete a task that has been assigned to him, albeit slowly as a result of his short attention span, and he often wanders off halfway through the task. When he becomes distressed, he starts to harm himself by knocking his head with his arm. The music teacher provided a brief description of the child's engagement with music:

> Child 3 will rock back and forth when he hears the music. He will engage in playing the drum if I sit with him giving him full attention.

> When playing together with other pupils, he will quickly wander off. He is sometimes proactive in music if attention and prompts are given, but mainly reactive in music.

4.2.4 Child 4

Child 4 is a Congolese male who was nine years old at the time of the research. He was diagnosed with ASC along with other learning difficulties, such as sensory needs and behavioural challenges. He is non-verbal and at stage 1 of PECS with regard to communication. Child 4 requires one-to-one support to address his behavioural issues and struggles with transitions. The music teacher described the child's experience with music as follows:

> Child 4 is reactive during music lessons; however, he is able to copy rhythms and make up some tunes on tuned percussions sometimes. He can be very engaged in musical activities for a few seconds if he is tuned to what you are doing. During the last couple of music lessons, he was able to copy rhythmic patterns consistently for 4–5 weeks. We noticed that he might be moving to Level 3.

4.3 Results: Strategies in Level 2 SoI framework

This section presents the results and explains the underlying patterns and trends that were observed and derived from the quantitative data. The processes were subjected to IPA to understand the engagement of the children (Smith, 2010; Smith & Eatough 2007). Interpretative phenomenological analysis was applied to determine trends and emergent themes from the behaviours of the children during their engagement in the sessions. The underlying patterns of behaviour were then grouped into several scenarios, which this chapter discusses below.

Based on the SoI framework, each strategy applies to one of three domains: reactive, proactive or interactive. The framework conceptualises children's engagement with music as occurring in these three domains (See Chapter 3). This study identifies six strategies on Level 2: three strategies in the reactive domain, one strategy in the proactive domain and two in the interactive domain.

4.3.1 Reactive: Element A

The SoI framework posits that, at Level 2, sounds are processed as a distinct sensory experience. It recognises active listening as a crucial step in musical development. Broad listening experiences can develop an awareness of sound as a distinct perceptual entity, which can promote recognition of the variety of possible sounds (Ockelford, 2013). Besides listening, integrating sensory inputs, such as visual and kinaesthetic input, to form meaningful bundles of sensory information can allow the concept of 'sound' to emerge.

The strategies that this study employed used the piano not only as a 'sound producer' but also as a sensory tool to provide children with a multisensory experience. In this context, the piano is used not only conventionally to play a repertoire of pieces but also percussively to produce a wide variety of sonic textures through its versatility (see Chapter 3).

To decide which piece to use or sound to make, I first obtained information from the music teacher and class teacher of the child regarding the music and sounds that the child had experienced. This information included songs to which the child had listened in the classroom, such as nursery rhymes or songs on YouTube, and descriptions of the reactions of the child when listening to the music. Furthermore, teachers shared the musical activities that they had undertaken in their music class, such as the

different sounds that they had explored (e.g. the sound of bells; high-register sounds, glissando; ocean sounds using the ocean drum; rapid drumming that represents a thunderstorm).

Using sounds that are familiar to the child offered motivation to engage in a musical activity that was completely new to them (Scott, 2016), which was a one-to-one piano session in this case. Based on the collected information, I compiled a list of sounds and songs with a lesson plan for each child. At this stage, I was not concerned with whether the children reacted differently to different sounds - only that they had any reaction to sounds. As far as I could ascertain, the children had never had an opportunity to systematically explore the piano.

This study illustrates the importance of scaffolding in a child's musical learning, as framed within the theory of Vygotsky's ZPD (see Chapter 2). Musical knowledge and perception are internalised through listening experiences within the reactive domain before being externalised through engagement in the interactive domain. Children at SoI Level 2 are initially supported by others and then realised proactively until they demonstrate the ability and confidence to create material alone.

I adopted strategies that have commonly been used for children with ASC and PMLD and applied them to the piano. To encourage the child to look and listen, I used gestures and called the child's name to direct his or her attention to the piano and engage in eye contact. I also offered simple verbal instructions, such as 'look', to direct the child to observe the hand movement on the piano. Occasionally, I demonstrated by positioning my ears near the piano keys or touching my ears to encourage the child to listen. These actions are part of a communication strategy that is known as the augmentative and alternative communication system, wherein one uses a range of

modes other than speech to support his or her communication. Such modes include using facial expressions, gestures, speech approximations, communication passports and electronic devices (Harding, Lindsay, O'Brien, Dipper & Wright, 2011; Bradley, 2013).

Strategy 1 (R.2.A.1)

In this strategy, the teacher makes a range of sounds or plays short pieces on the piano to assist the child in realising that the piano is capable of making sounds. I understand that a child at this stage the child is not likely to be capable of procesings the songs or short pieces; however, in their interviews, the child's teaching assistant and music teacher provided useful information, such as the child's apparent fondness for one or two nursery rhymes, which might have acted as a motivator or initiator to draw the attention of the child towards the piano.

The SoI level of the child was not always clear. While the music teacher might assess him or her to be at Level 2 (proactive and interactive), the child might be able to recognise one or two nursery rhymes to which he or she has listened several times in class or during a music lesson.

Child may engage through listening. However, researchers proposed that children with ASC might attend to those matters which they find most important. Uta Frith's WCC theory (1989; 2003) discusses this distinctive attentional focus. The decision of which tasks to attend to is based on a large amount of pooled information, and weak coherence at this central decision-making point could cause a child to lose the direction of attention. Therefore, I acknowledged that the children might not listen in a conventional way, such as by listening attentively or looking at the source of the sound while listening, and may instead wander off or look around the room as though they were not paying attention to the sound.

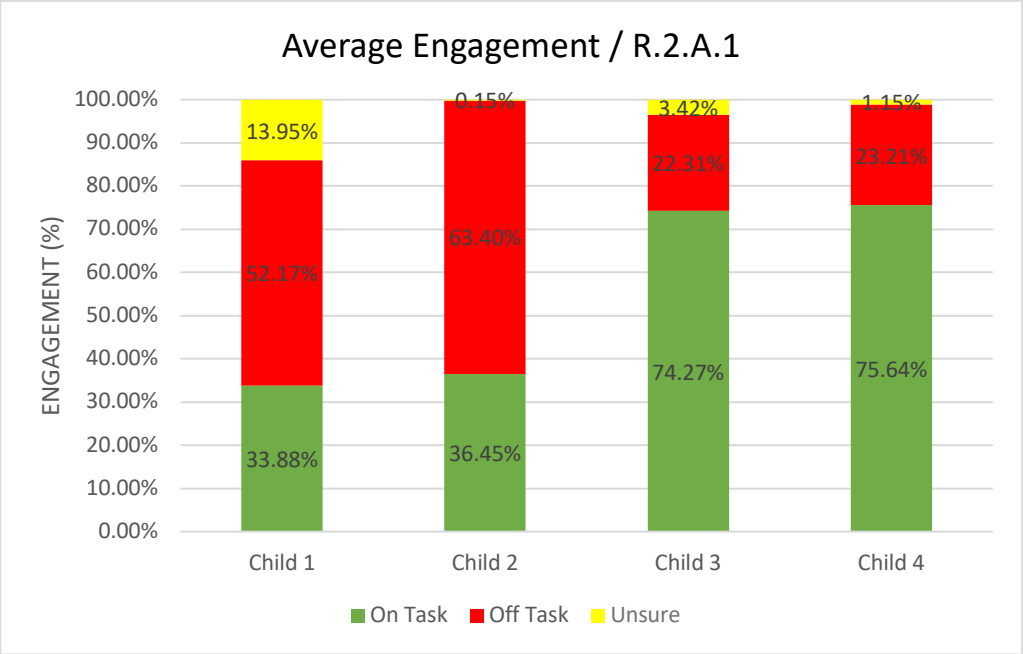


Figure 7. Average engagement of Child 1, Child 2, Child 3 and Child 4

According to Figure 7, Child 1 and Child 2 exhibited lower engagement compared to Child 3 and Child 4. These results were analysed and explained with respect to two regards: the factors that affected the children's engagement and the teacher's thought process and actions. The scenarios are presented as follows:

Table 11. Scenario 1

Researcher's action:	I implemented R.2.A.1 by playing the child's favourite nursery songs with pauses between each song.
Child's reaction:	The children ignored my action and did not look at the source of the sound or at me. They subsequently wandered off and laid on the floor. This occurred with Child 1 and Child 2.
Analysis:	This scenario suggests that the child had no understanding of the practice at hand and thus struggled to engage in the task. The child may not have been aware of the sounds due to her difficulty with 'sensory integration', which would hinder her from linking incoming data from multiple sensory modalities. This cognitive

	anomaly may link to Frith's WCC theory, which dictates that children tend to focus their attention on parts rather than the whole. In this scenario, the child may have faced the challenge of focusing on a series of sounds that were made on the piano, the chewing toy and the new environment in which she was situated. According to Eaves and Ho (1997), the educational progress of children with ASC can be affected by their limited capacity to self-regulate emotional and behavioural responses and remain on task. These limitations were evidently the case for Child 1, as she felt distressed and constantly chewed on her toy to regulate her emotions, which distracted her from becoming aware of the sound of the piano or remaining on task. Moreover, the child may have experienced difficulty with switching attention from classroom activities to music sessions, which would further disengage her from the task. In addition, according to Fleming (2014) and Barbe and Swassing (1979), learners vary in learning modalities, which can either visual, auditory, tactile and kinaesthetic. Perhaps an auditory modality was not Child 1's learning style; therefore, other modalities should be considered to assist the child in appreciating the sound-making capability of the piano. Child 2 was distracted by external stimuli, thus losing focus on the piano task and engaging in other activities. On several occasions, the child became distracted by the sticker letters on the piano and started to tear the stickers and place them in his mouth. Instead of focusing on the piano task, the child was completely distracted by the stickers and would not focus on the task at hand. On another occasion, the child was obsessed with playing with a

	pen.
Researcher's thought process and actions:	Taking into consideration the factors above, I first decided to redirect the child to the piano; however, when this failed, I decided to continue providing a wide range of listening experiences for the child. According to Bogdashina (2016), some children with ASC use the preconscious (indirect) system to absorb information, whereby they use their senses peripherally. This allows them to take in a great amount of information despite being 'absent' from the process. For instance, the child did not seem to be listening, but she might have been listening to the music unconventionally or indirectly by, for example, internalising the sound while lying on the floor. If this was the case, it would raise the question of how long to continue with this strategy. According to Ockelford (2013), the teacher should always observe and listen to the child's actions and react accordingly. If the child reactis positively to a particular sound or song, that sound or song could be used more extensively to expand their learning, which scaffolds the child to create such material on the piano. If the child exhibits a negative reaction, the teacher could proceed to the next strategy or choose another sound or song and observe the child's reaction again.

Table 12. Scenario 2

Researcher's action:	I implemented R.2.A.1 by making a sound on the piano.
Thought process of making a decision on which sounds were to	In deciding which sounds to make on the piano, I considered several questions: Did the child react fondly to the sound in a previous

be made:	session? Was the child unsettled or distressed when encountering the sound? If neither question applied, I chose one sound and observed the child's reactions and only then determined the next step.
Child's reaction:	The child ignored my action.
Analysis:	Again, the child ignored my action and did not look at the source of the sound. This lack of a reaction could suggest that the child did not like the sound. Otherwise, it could be due to difficulty with sensory integration, as discussed above, the strategy may not have worked and needs to be changed.
Researcher's thought process and action:	In this case, my thought process proceeded through several phases: Phase 1: I would determine if the child liked the sound by, for example, playing a contrasting sound to test whether the child reacted to another sound. Phase 2: If the child was purely ignoring the sound, I would with the aim of eliciting a reaction or would instead provide a listening experience for the child. Phase 3: If the child was ignoring the sound because he or she was not responding to the strategy, I would adopt another strategy. For instance, if Child 1 was not responding to strategy 1 (auditory modality), I would implement strategy 2, which combines tactile and kinaesthetic modalities with the auditory modality.

Table 13. Scenario 3.

Researcher's action:	I implemented R.2.A.1 by playing the child's favourite song or sounds for which they had demonstrated a preference.
Child's reaction:	The child reacted by moving their body throughout the time I was playing. Both Children 1 and 3 exhibited this response.
Analysis:	During the sessions, it was obvious that Child 1 reacted especially fondly to the song 'Five Little Monkeys'. This song was the only sound or song to which the child consistently responded by rocking her body. Since the child recognised the song, she would not be classified as SoI Level 2 in this case. Meanwhile, Child 3 moved his body whenever I played on the piano and did so mainly on the beat. According to Moog (1976) babies typically begin to move spontaneously to music at the age of six months. In addition, Clayton et al. (2004) described the formation of a regular pulse in the listener's mind that is cognitively and physically synchronised with movement. This formation occurs through the process of 'entrainment', wherein pulses interact so that the movement occurs at the same rate. Such musical behaviour occurs at Level 3, so the child may be approaching Level 3. However, a paper by Voyajolu and Ockelford (2016) on SoI in the early years discovered that 'overlapping' development occurs along the whole spectrum of the SoI early-years framework, which indicates that children demonstrate differing levels of development. Here, Child 3 had only started to realise that the piano was capable of producing sounds and explore ways of making sounds (see proactive strategy 1); however, he was

	already able to move with a regular beat, which is a form of engagement at Level 3.
Researcher's thought process and action:	In this scenario, I approached the children in different ways. For Child 1, to determine more about the child's reactions, I made several modifications to the strategy and observed the child's reaction. The strategy evolved as follows: Phase 1: I suspected that the child might have been reacting to the regular beat. To check, I removed the melody and played only the left-hand accompaniment to gauge whether the child would react in the same way. Phase 2: I then omitted the left-hand accompaniment and played only the melody. Child 1 stopped moving when the melody was taken away, and she laughed when only the melody was played. The child reflected a strong preference for how I played the song. She may have reacted to the song 'Five Little Monkeys' because, to her, it was not a complete melody but rather a series of sounds that she likes. As she listened to the same song repetitively, the tune became familiar, and she grew particularly fond of the song. Perhaps it was the upbeat of the music that triggered her to rock along with the music. The child may be progressing towards Level 3, at which stage she will start to feel the regular beat and pulse. It seems that Child 3 had already gained awareness that the piano was capable of producing sounds, and he enjoyed listening to the sounds. He was also keen to interact. When I stopped playing, he

	would look at me and vocalise. I assumed that he was communicating and indicating for me to continue. With this in mind, I continued with the current strategy, as the child demonstrated a fondness for listening. Since Child 3 exhibited positive engagement in the task, I proceeded to the next stage, wherein I determind whether the child only reacted to or preferred certain sounds, which eventually leads to strategy R.2.B.1.

Table 14. Scenario 4.

Researcher's action:	I implemented R.2.A.1 by playing a sound on the piano.
Child's reaction:	Child 1: The child consistently knocked on the piano while I was playing. Child 2: The child looked and to bang on the piano. In addition, he reacted to some events by gliding his fingers across the keys. Child 3: The child started to vocalise and pressed the keys on the piano. Child 4: The child reacted by looking, and when I stopped, the child tried to imitate playing the same key.
Analysis:	In this scenario, the children reacted to the sound in a variety of ways. It is unclear why the children behaved in these ways and with which underlying intentions. For instance, Child 2 banged on the piano, which he could have done to block out the sound from my playing or simply to explore the piano. Nevertheless, it seems that the children were aware that the piano was capable of making sounds, as evidenced by their reactions as I played the piano. The children may have recognised the capability of the piano to produce sounds and sought to convey this understanding

	to me by knocking (Child 1) or banging on the piano (Child 2) or by vocalising and pressing the keys on the piano (Child 3). For Child 4, this musical behaviour corresponds closely to SoI element I.2.A — 'sounds made by another stimulate a response in sound'. However, this child interacted with me by imitating my sound, which indicates that the child functions at the beginning phase of Level 3.
Researcher's thought process and actions:	I approached the children in different ways. **Children 1, 2 and 3** The meaning behind the knocking and banging is unclear, but they may have been only random behaviours. To assess this, I observed and repeated the strategy again. The behaviour recurred several times, and it seemed that the children were exploring the haptic and tactile nature of the piano. For them, it was a sheer pleasure to produce sound by banging, knocking and pressing the keys on the piano. Perhaps this was the only way in which the children knew how to produce sounds on the piano. For Child 1, this behaviour could be due to her weak motor skills, which might make it easier for her to knock on the wooden keys than to press them down. However, the child may also have imitated my hand movement as I played the piano. Child 1 acknowledged my playing by knocking on the piano, whereas Child 2 did so by banging on it, and Child 3 pressed the keys. Since the children were already capable of producing sounds on the piano and they were aware that the piano is capable of producing sounds, I changed to a proactive strategy to help the children create sound in different ways, such as by gliding across the keys or gently

	pressing down individual keys. **Child 4** Interaction occurred with Child 4, who engaged with me by imitating my playing. Level 3 of SoI describes this behaviour; therefore, to scaffold the child's learning and progress, I adapted the strategy to be more proactive and interactive and prepared the child to progress to SoI Level 3.

Table 15. Scenario 5.

Researcher's action:	I implemented R.2.A.1 by making a sound on the piano.
Child's reaction:	The child felt unsettled, started to cry and wanted to walk away. The child pushed me away at the same time.
Analysis:	In this scenario, the source of the child's distress is uncertain. For example, it could have been the sound that I played, the child's fatigue and desire to stop, or a decrease in attention span.
Researcher's thought process and action:	I took the following steps to further investigate the source of distress and determine my next action: Phase 1: Perhaps the child did not like the sound. To test this possibility, I switched to another sound or song to which the child had previously expressed a positive reaction. I observed her reaction; if she reacted well when the sound changed, I carried on with the strategy by using different sounds and taking note of which sounds the child disliked. Phase 2: If the child was still feeling distressed and unsettled, I stopped the lesson to calm the child.

Table 16. Scenario 6.

Researcher's action:	I implemented R.2.A.1 and played a sound on the piano.
Researcher's decision on which sounds were to be made:	The child had not exhibited preference for any specific sound, so to determine which sound to play, I chose one sound, and observed the child's reaction, and then played another sound. This process provided a broad listening experience for the child.
Child's reaction:	The child engaged by looking at the piano, albeit not consistently throughout the session. The child also leaned on the piano to listen.
Analysis:	It seems that the child is starting to gain awareness of the sound made on the piano, as evident from the engagement via looking at the source of the sound or leaning against the piano as I played. Children with ASC may not attend to sounds in the conventional way, i.e. by looking at the source. Here, the child was clearly engaging by placing his ear on the piano so that he could listen to the sound it was producing.
Researcher's thought process and action:	Since the child positively engaged in reacting to the piano sounds, the next step was to observe if the child behaved consistently throughout the session. To this end, I continued to play the same sound and observed the child's reaction. The second stage then tested if the child reacted in the same way to all of the sounds made on the piano; therefore, contrasting sounds were played according to the same strategy.

The analysis above reveals certain similarities in behavioural patterns that emerged among the children. Offering appropriate responses could advance the child's awareness of the piano's capability of producing a range of sounds. It is difficult to

quantify the engagement of each child in view of the many factors, such as cognitive and concentration levels, daily mood and learning modalities, that can affect their engagement and behaviour.

In summary, the strategy (R.2.A.1) was effective to support the child in gaining awareness of the sound. Some children might not have listened or responded to the sounds in a conventional way by sitting and listening attentively. Instead, they may have wandered off, looked away from the piano, placed their ear on the piano to listen closely, or touched the piano to feel the vibrations.

Strategy 2 (R.2.A.2)

The children displayed different learning modalities, and some may not have responded to strategy 1, which focuses on the auditory modality. In comparison, strategy 2 combines tactile and kinaesthetic modalities with the auditory modality to assist children in gaining awareness of sounds from the piano. The teacher demonstrates a range of sounds or played short pieces on the piano by integrating kinaesthetic input to illustrate for the child that the piano is capable of making sounds.

Strategy 2 uses two sensory modalities, namely touch and sound, to assist children in recognising that the piano is capable of making sounds. The strategy integrates the kinaesthetic sense to complement the auditory sense. Konstantareas and Homatidis (1987) reported that children with ASC had a higher incidence of ear infections compared to their matched neurotypical peers. In addition, low-functioning children with ASC experienced an earlier onset of ear infections compared to those with high-functioning autism. The ear infections may hinder the sound from passing through to the inner ear, thus making it more difficult to hear quiet sounds. Other studies often associated individuals with ASC with auditory processing disorder. For instance, Delacato (1974) and Grandin (2006) described hypersensitivity in the auditory process,

while Kanner (1943) and Koegel and Schreibman (1976) investigated how individuals with ASC can be hyposensitive or unresponsive to certain sounds. Meanwhile, Ornitz (1974) suggested that some individuals with ASC are unable to modulate certain sounds, and Condon (1975) and Rimland (1964) highlighted that individuals with ASC exhibit delays in auditory processing. These insights can inform a strategy for coping with these difficulties through the use of another sensory modality.

I used the hand-under-hand technique to allow the children to 'feel' the source of the sound, which originated from the movement of my hand as I played the piano. This technique is applied for deaf-blind children, who lack a considerable degree of visual and auditory senses and need support to engage with objects (Miles & Lanes, 2003). Van Dijk (1976) called this technique the 'things of action': objects that allow children to perform physical actions. Since children who are deaf-blind require the support of adults to explore objects, the hand-under-hand exploration technique is among the most effective techniques to provide an opportunity for the child to perceive the 'whole' of an object (Miles & Lanes, 2003). In this technique, the adult's hand is placed underneath the child's hand to guide the child in performing a particular activity. Such a technique is less intrusive to the children when they are first introduced to a new activity or object because they can feel the movement of what the adult's hand is doing rather than the unknown object. Because their palms are on the adult's hand, they can also focus their energy on feeling the hand movements and become more comfortable and in control, as they can freely remove their hands if they so desire. This technique is useful with children with ASC who have difficulties with sensory integration. Some children with ASC possess hypersensitivity to sensory input (Bogdashina, 2016; Delacato, 1976; Grandin, 2006), and the hand-under-hand technique ensures that children have control as well as the option to remove their hand

at any time if they do not feel comfortable. The technique can additionally assist children with auditory processing problems.

Since not all children could consistenly maintain their hand position on my hand, I also adapted the general kinaesthetic strategy by, for example, having a child rest his or her hand on my arm to feel the movement. I introduced the strategy in accordance with the assessed abilities of the child. The strategy is based on the notion of 'capability' (Terzi, 2005) and celebrates each child's individual musical journey (see Chapter 2). However, some children may or may not be able to tolerate the input, so an an alternative strategy, such as R.2.A.1, was employed for children who could not tolerate kinaesthetic input.

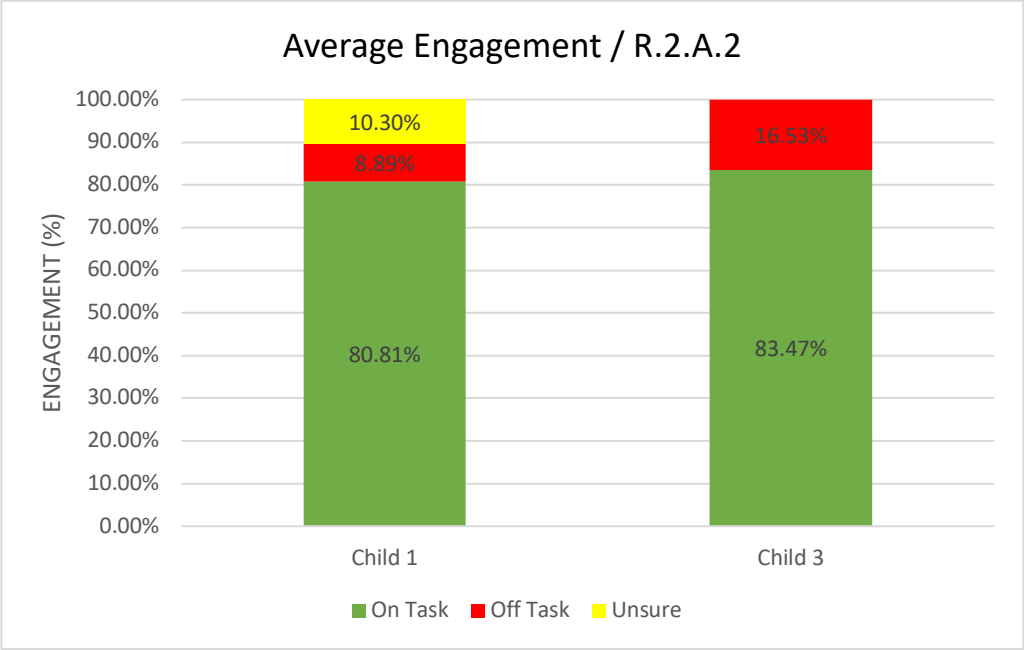


Figure 8. Average engagement of Child 1 and Child 3

As Figure 8 indicates, Child 1 was more engaged in the task when I implemented strategy 2 than when I applied strategy 1 (See Figure 7). Child 1 may have struggled with 'sensory integration', as it was a challenging for her to link incoming data through her auditory modality. It is also worth noting that Child 1 has glue ear, which can cause hearing impairment. Since strategy 1 seeks to impart awareness of sounds from the

piano through the auditory modality, such a medical condition and difficulties with sensory integration warrant consideration of other learning modalities. In this case, I utilised the tactile-kinaesthetic modality to assist the child in appreciating the piano's capability of making sounds. Child 3 had already gained awareness of sounds, and enjoyed listening to them and reacted fondly to those that he liked. The reason for implementing this strategy was to scaffold the child to demonstrate to him how I produced the sound, which could lead him to generate the sound on his own. Since some children with ASC are sensitive to touching certain objects, I first followed the child to 'play' the piano by feeling the movement of my hand before transferring his hand to play directly on the piano. The following scenarios that emerged from the inductive analysis of the events:

Table 17. Scenario 1.

Researcher's action:	I implemented R.2.A.2, which used the hand-under-hand technique to assist the child in gaining awareness of sounds from the piano through the tactile-kinaesthetic modality.
Child's reaction:	Child 1: The child ignored the sound and looked around the room while chewing on her toy. She could not tolerate the input well. Child 3: The child tolerated the input, but did not do so consistently throughout the session. Rather, he would take his hands off halfway through the activity.
Analysis:	Some children with ASC exhibit sensory sensitivity, or 'tactile defensiveness', whereby they do not want to be touched (Baranek, Parham & Bodfish, 2005). Here, the child could not tolerate the input, which could indicate touch sensitivity. She also ignored the source of the sound, which could connect this

	cognitive anomaly to Frith's WCC, as the child faced the challenge of focusing on the sound while having her hand held at the same time. As Child 1 illustrated in scenario 1, failure to self-regulate emotional and behavioural responses can affect the engagement of the child, Therefore, I had to be highly sensitive implementing the approach.
Researcher's thought process and action:	After considerating several factors that may have impacted the child's behaviour, I reverted to strategy 1 (R.2.A.1) to provide the child with a broad listening experience and subsequently attempted strategy 2 again. The strategy could be eliminated until several attempts had been made. To motivate the child, I also tried the strategy again with her favourite song or sound. Scenario commenced thereafter. To help Child 3 realise that the production of sound derives from the movement, I stopped whenever the child removed his hand from on top of my hand, which reaffirmed that the sound was due to the hand movement on the piano. This action also scaffolded the child to assume a more proactive role if he wanted more sound. When I stopped, Child 3 started to proactively push down my hand to play. This response corresponds to his earlier reaction during the implementation of strategy 1, whereby he communicated by controlling my hand to gesture to the sound he wanted to hear. Since the child developed a relatively mature skill in realising the sound, the next step was to scaffold him to adopt a proactive and interactive role in learning to produce sounds on the piano, which led to the scenario below.

Table 18. Scenario 2

Researcher's action:	I implemented R.2.A.2 by holding the child's hand while playing his or her favourite song in order to motivate the child.
Child's reaction:	Child 1: The child tolerated the input and looked at the piano. She moved her body from time to time and almost in time with the beat. Child 3: The child tolerated the input and started to press the keys by himself.
Analysis:	Child 1 clearly begain to tolerate the input from me. Perhaps it was the song that motivated the child, as the child reacted fondly to the song 'Five Little Monkeys'. Alternatively, the child may have gained familiarity with me, which enabled her to interact with me. For Child 3, the scaffolding was effective; the child began to independently explore the piano by pressing down on the keys with all of his fingers.
Researcher's thought process and action:	Child 1 seemed to enjoy feeling the movement of my hand playing on the piano. To ascertain if the child was only reacting to only the particular song or the strategy in general, I decided to continue with the strategy, but I changed it by playing other sounds on the piano and observing the child's reactions. From the observational analysis (see Appendix 7), the child engaged in most of the sessions when I implemented this strategy. The child was able to tolerate the input and occasionally looked at the piano and moved her body. These developments then led to the following scenario, which contributed to the interactive domain of SoI.

	Child 3 was able to take on a proactive role once he started to create sounds on the piano by pressing down the keys with all of his fingers. I decided to adapt the strategy to a proactive one to scaffold the child to create sounds on the piano in a variety of ways.

Table 19. Scenario 3 (applied only to Child 3).

Researcher's action:	I implemented R.2.A.2 and played different sounds and songs to help the child to gain awareness of sounds from the piano.
Child's reaction:	As I was played, the child held my hand and pulled it away from the piano before placing it back on the piano again. This occurred several times in some of the sessions.
Analysis:	This physical evidence suggests that the child was starting to realise that the piano is capable of making sounds. It seems like the child was exploring or testing how the movement of the hand affected the origin of the sound. Thus, she was reaffirming that the sound came from the hand that played the piano. She also assumed a more proactive role by controlling my hand when making a sound. Moreover, her facial expressions included making eye contact with me and smiling when the playing stopped, which indicates that she enjoyed this 'little game' with me.
Researcher's thought process and action:	From the above evidence, I am certain that this strategy worked more effectively than strategy 1 (R.2.A.1) in helping the child become aware that the sound came from the piano. To further clarify the mechanism for the child, I stopped playing when she pulled my hand away from the piano, which created a moment of

	silence in the room. When the child pulled my hand back onto the piano, I started to play again. Thereby, I employed the kinaesthetic modality to convey the source of the sound to the child. Such progress led to proactive and interactive activities.

Strategy 2 was implemented with only two children because Child 2 and Child 4 were not able to tolerate the input of me placing their hands on mine. According to Bogdashina (2016), such a condition is known as sensory intolerance. Some individuals with ASC are unable to tolerate certain input. For example, Grandin and Panek (2013) described an intolerance for the sound of the bells in school, and Williams (1996) found difficulties with touching certain objects. In this case, when I tried to place the hands of Child 2 and Child 4 on top of mine, they immediately retracted and would not allow me to hold their hands. Therefore, the strategy is not suitable for children with tactile sensory intolerance, who should be accommodated with other strategies - in this case, strategy 1. For Child 1 and Child 3, who enjoyed tactile input, strategy 2 was effective in clarifying the source of the sound for the children, especially Child 1, who did not engage much with strategy 1. By using kinaesthetic and tactile input to feel the movement, the child fained an understanding and awareness of the origin of the sound.

In summary, the strategy (R.2.A.2) was effective to support the child in becoming awaren of sound through physical connection. For Child 1, who did not understand how the sound was produced or its source, the use of kinaesthetic and tactile input to accommodate auditory input would be a more suitable strategy to teach the concept to the child. For Child 3, this strategy scaffolded him to create sounds on the piano, first by allowing him to control the my hand and then by transferring his hand to the piano.

4.3.2 Reactive: Element B

Once the child developed awareness that the piano is capable of producing sounds, the strategies were expanded to provide contrasting sounds for the child to experience. The strategies employed in this context were similar to those for Reactive Element A, and I used the sounds that the child had previously experienced but modified them in various ways, such as by making them louder and quieter, higher and lower or faster and slower, or by generating different textures of sound (e.g. single notes alongside clusters of notes or chords). I adopted strategies that are commonly applied for children with ASC and PMLD, such as using labels for different qualities of sounds, such as loud or quiet and high or low. With this element, I anticipated that the child would learn that the piano can create a range of sound qualities.

Strategy 1 (R.2.B.1)

The teacher demonstrates contrasting dynamics (loud and quiet), contrasting sounds (high, middle and low) and a contrasting texture of sounds (single notes and clusters of notes and chords) to assist the child in realising that the piano is capable of making a range of dynamics, a register of sounds and many sound textures.

With this strategy, the child engages by listening, although perhaps not conventionally. Still, once he or she has developed awareness, the child might exhibit various reactions to the sound qualities, which may be conveyed through facial expressions, body language or gestures.

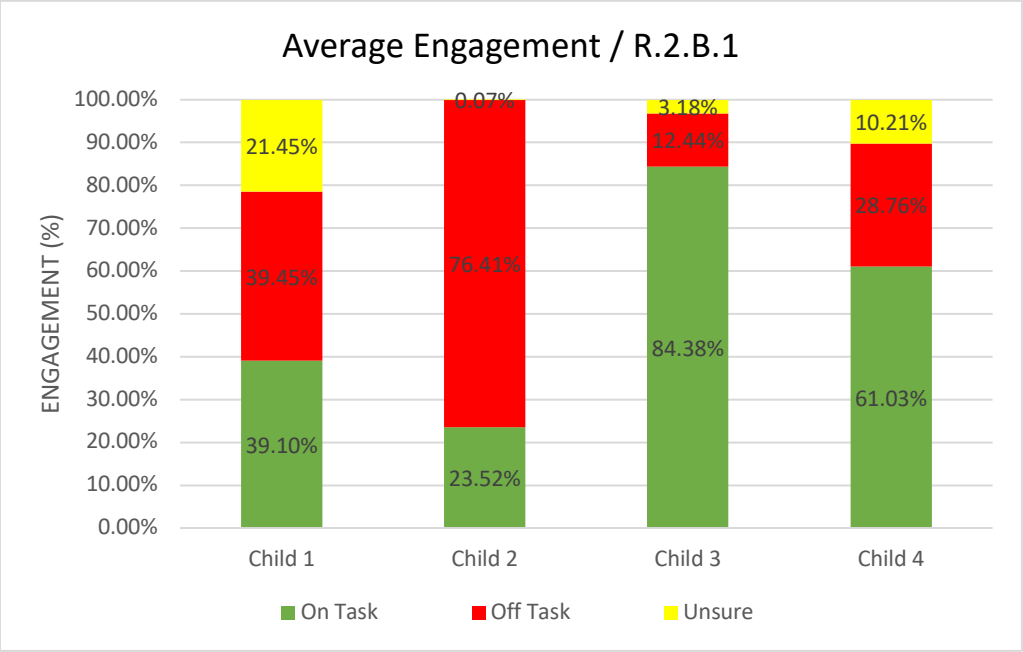


Figure 9. Average engagement of Child 1, Child 2, Child 3 and Child 4

Figure 9 illustrates that Child 3 and Child 4 had the highest engagement percentages, which suggests that both children were aware of the different sounds that the piano can make. They also reflected a strong preference for the sounds that they liked. The lesser engagement of Child 1 and Child 2 may be due to several factors: (1) they were yet to establish a clear awareness of different sounds that can be made on the piano; (2) they were listening to the sound unconventionally and not looking at the source of the sound; or (3) they liked to proactively engage through producing sound on the piano rather than listening attentively, which was the case for Child 2.

Table 20. Scenario 1

Researcher's action:	I implemented R.2.B.1 and played contrasting sounds for the child.
Child's reaction:	Child 2 ignored the action and was distracted by external stimuli.
Analysis:	In this scenario, Child 2 seemingly lost his concentration on the task and became distracted by external stimuli, such as by playing with the sticker letters on the piano. Child 2 has a particularly

	short concentration span and would not sit and listen attentively. Moreover, since he was occupied with external stimuli, it was difficult to redirect his attention to the task.
Researcher's thought process and action:	The child was disengaged from the task; therefore, I tried to attract his attention back to the piano. To this end, I first called his name and stopping him from playing with the stickers. However, when this failed, I decided to continue playing contrasting sounds for the child. Children with ASC use the preconscious (indirect) system to take in information but are 'absent' from the process. Although the child did not seem to be attending to the sound, he encountered it, and with the music as background noise, he may internalise the music.

Table 21. Scenario 2

Researcher's action:	This strategy was an expansion of R.2.A.1, and it used the same strategy (auditory approach) to assist the child in gaining awareness of sounds on the piano. This strategy focuses on contrasting sounds, such as loud versus quiet, high versus low and fast versus slow. I played contrasting sounds on the piano with pauses in between each sound to allow the child to react.
Child's reaction:	The child occasionally looked at the piano but expressed no other reaction when I played contrasting sounds. This behaviour was evident mainly in Children 1 and 2. Child 2 would also start to bang on the piano on some occasions.
Analysis:	This instance illustrates that the child had no understanding of the range of sounds, which may be due to his lack of exposure to a broad variety of listening experiences. Otherwise, the child may

	have not engaged in the task simply due to difficulty with sensory integration. It is unknown why Child 2 banged on the piano, but it could have been an attempt to block out the sound from my playing or merely because the child enjoyed producing the sound.
Researcher's thought process and action:	My observations evidence that the child had no knowledge of the different types of sound and no preference for sounds. The most effective approach to assist the child in realising the different types of sound was to continue stimulating the child with a wide variety of contrasting sounds. Since the behaviour of Child 2 was consistent throughout all of the sessions, it seemed that the child liked to bang on the piano. In this case, I allowed the child to explore the production of sounds by himself and then scaffolded him to produce sounds in other ways, such as by gently pressing down on or gliding across the keys, at which point the strategy changed to a proactive one.

Table 22. Scenario 3

Researcher's action:	I implemented R.2.B.1 and played the piano loudly and quietly as well as quickly and slowly.
Child's reaction:	Child 1: The child engaged by looking at the piano. No reactions were observed when I played quietly and slowly. In contrast, when I played loudly and quickly, the child burst into laughter. Child 2: The child leaned on the piano to listen when I played rapid, low sounds. Child 3: When I moved to play high sounds, the child immediately stopped his body movement and pulled my hand back towards the lower register of sound. He did this every time I

	played high sounds. Child 4: The child covered his ear when I played low, loud sounds on the piano, but he engaged when I played high sounds.
Analysis:	It seems that the child started to recognise contrasting sounds or different types of sound on the piano, as evident from her reaction of sudden laughter when I played quickly and loudly. This reaction occurred during her third piano session. The child appeared to make progress in her musical development, as she had exhibited no reaction in her initial lesson but could start to or already recognise and react to contrasting sounds in the third session. In regard to Child 4, research illustrates that certain children with ASC exhibit hypersensitivity in hearing (Lucker, 2013). Gomes, Pedroso and Wagner (2008) found negative responses, such as running away, demonstrating strong and startled reactions to the sounds or yelling and screaming in response to loud and annoying sounds. In this case, when encountering loud sounds, Child 4 immediately covered his ears, so he may be sensitive to them.
Researcher's thought process and action:	Since Child 1 expressed drastically different reactions to loud and fast sounds, my next step was to determine if the child would react in the same way again when such sounds were played on the piano. However, no reaction was observed, so the response may have reflected a fleeting moment in which the child liked the sound or was amused by how I played it. I then decided to continue exposing the child to contrasting sounds. Loud sounds should be avoided if a child is hypersensitive to

	them, as they can trigger negative behaviour, such as covering one's ears to block out the sound, running away or experiencing distress. Music learning should be fun, and children learn most effectively when they enjoy it (Hargreaves, 1986; Swanwick, 1988). When teaching children with ASC, it is important to be sensitive to other learning difficulties and issues that the child may present, and the teacher should modify the teaching practices and material accordingly. For instance, in this case, it was appropriate to refrain from playing loud sounds and switch to sounds that the child could tolerate in order to avoid upsetting or agitating the child.

Table 23. Scenario 4 (applied only to Child 3)

Researcher's thought process and action:	I implemented R.2.B.1 and played three textures of low sounds: a single note, two notes at once or a three-note chord. I paused after each sound to provide sufficient time for the child to process it. I then tried to communicate through gestures to ask the child to choose the sound that he liked.
Child's reaction:	The child pulled my hand to indicate which sound he wanted. He then pushed my hand down to listen to the sound, and if he liked it, he would stop pulling my hand and let go of his hand, which signalled that I could continue to play the sound.
Analysis:	It was fascinating to witness how a non-verbal child used gestures to communicate which sound he liked. This action corresponds to a framework by Ockelford (2013) for the five stages of communication. The child is currently in stage 2, wherein he deliberately uses non-symbolic gestures to communicate his

	desires in the gestural-visual domain.
Researcher's thought process and action:	With such progress, I could provide appropriate scaffolding to encourage the child to interact more. I modified the strategy and provided pauses between the sounds to allow the child to choose the sound and thereby engage in interactive (see I.2.A.1) and proactive (see P.2.A.1) activity by which he could produce his own sounds on the piano. Here, joint attention and cause and effect were key notions. Child 3 and I were attuned to each other and shared an activity. I created sounds that the child liked to encourage him to initiate an interaction. In addition, to illustrate to the child that his action could have an effect on me, I provided appropriate responses, such as beginning to play when the child pushed my hand down to the piano.

In summary, this strategy (R.2.B.1) warrants improvement to support children in learning different types of sound. As a possible revised strategy, future teachers could divide the strategy into two parts: one that focuses only on auditory input and in which the teacher plays a variety of sounds for the child, and another which applies labels to all of the types of sounds to teach the child through visual and auditory means.

4.3.3 Proactive: Element A

In this context, Vygotsky's ZPD is significant, as it stresses the importance of the environment in learning and development in the early years, and it recommends scaffolding as a means of providing environmental support (Wood, Bruner & Ross, 1976). This project envisions scaffolding to include the provision of an appropriate groundwork by the teacher that can support the child's piano-learning experience and

enable him or her to succeed in producing sounds on the piano. Wiggins and Espeland (2012) characterised music learning and teaching as a constructive process for individuals that takes place in a social context. This characterisation implies that the process of constructing knowledge occurs when a more knowledgeable person supports an understanding of such knowledge or ideas (Rogoff, 1990; Vygotsky, 1978).

Playing the piano relies on several brain functions, including cognitive skills for concentration, fine motor control and coordination for physical execution of sounds, and sensory integration of input from proprioception, vision and hearing. Studies indicate that children with ASC and learning difficulties exhibit poor executive function (Hill, 2004; Gray et al., 2012) and a delay in fine motor function (Leary & Hill, 1996; Ozonoff et al., 2008; Lloyd, MacDonald & Lord, 2013); therefore, scaffolding is a critical approach to support children with ASC in intentionally producing or controlling sounds.

Strategy 1 (P.2.A.1)

With the hand-under-hand or hand-over-hand technique, the teacher supports the child in pressing down the keys with various touches (using one finger, the palm, the arm or the elbow or gently touching, banging, striking or hammering the keys) to explore the range of sounds that they can produce on the piano.

This strategy employs the piano as a sensory medium which delivers tactile or haptic input to allow the child to feel the surface of the piano through a variety of touches to create a range of sounds. However, some children with ASC exhibit sensory integration dysfunction (Ayres, 1979), whereby they have difficulties with processing the intake, organisation and output of sensory information. Herron (1993) described sensory integration as the ability to register and modulate stimuli, motor coordination,

attention, motor planning ability, balance, eye control, emotional stability, behavioural control, body scheme and self-esteem. Children with ASC may experience tactile defensiveness, wherein they avoid or display aversive reactions to a variety of tactile experiences (Bogdashina, 2016). Such children might not be able to tolerate input from a teacher holding their hand to press down the piano keys. In such a case, I would first produce the sound as a demonstration and then gradually introduce touch to allow ample time for the child to become ready to create sounds on the piano. For children who are unable to tolerate the tactile experience of the piano's surface, I would permit the child to hold and control my hand to create sounds on the piano. Subsequently, I would gradually shift from controlling the hand to touching the surface of the piano and creating sounds. The anticipated learning of this strategy is that the child realises that different physical actions produce different qualities of sound.

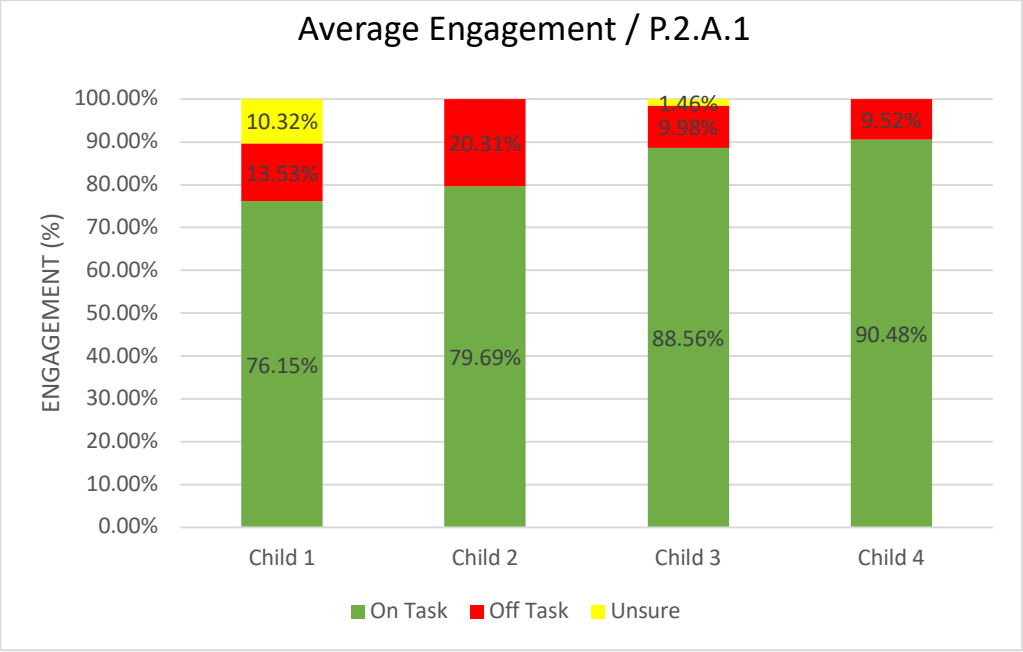


Figure 10. Average engagement of Child 1, Child 2, Child 3 and Child 4

Figure 10 indicates above-average percentages of engagement in the task for all of the children. These findings suggest that providing appropriate groundwork – in this instance, physical support – helps the child produce sounds on the piano. This effect

corresponds to Vygotsky's ZPD, which emphasises the importance of the environment for learning and development in the early years and suggests that an adult first scaffolds a child before the child creates the materials independently. The scenarios below are summarised from the observational analysis (see Appendices 7, 8, 9 and 10) of the children:

Table 24. Scenario 1

Researcher's action:	I implemented P.2.A.1 and held the child's hand to press down the keys.
Children's reactions:	The children could not tolerate the input and felt distressed. This was evident with Children 1, 2 and 4.
Analysis:	As noted, children with ASC may experience tactile defensiveness, wherein they avoid or display aversive reactions to a variety of tactile experiences (Bogdashina, 2016). For Child 1, this was not the first time that she felt distressed and could not tolerate the input, as this behaviour was observed when implementing strategy R.2.A.2. In that case, she could not tolerate it at first, but after several attempts, she became tolerant. This adjustment may be due to the child not being familiar with me and feeling uncomfortable when I held her hand. Alternatively, she may have difficulty with sensory integration and could not focus on the given task. From the onset, both Child 2 and Child 4 were unable to tolerate me holding their hands, even after several attempts. It is possible that they disliked the sensation of being touched.
Researcher's thought process and action:	Regarding the two cases above, I changed the strategy for Child 1 back to R.2.A.1 to calm the child down and remove the sensation

	of touch. Implementing strategy R.2.A.1 could allow the child to continue to internalise music and sound. Afterwards, I implemented P.2.A.1 again. Neither Child 2 nor Child 4 could tolerate the sensation, but it was obvious from previous strategies that both children already knew how to produce sounds on the piano; Child 2 always banged on the piano, while Child 4 imitated pressing the keys down on the piano. Therefore, I provided appropriate support to prompt the children to play by calling their name or pointing towards the piano keys, or I demonstrated the production of sound and allowed the child to imitate me (Child 4). In the last two sessions, I attempted to hold Child 2's hand again to press down the keys, as I wanted to illustrate to the child that one can play with individual fingers instead of banging aggressively on the piano. Surprisingly, the child was able to tolerate the action and started to produce sound with his fingers.. This progress implies that time and proper scaffolding supported the child in developing the skill.

Table 25. Scenario 2

Researcher's action:	I implemented P.2.A.1 and held the child's hand to produce the sound.
Children's reactions:	The children tolerated the input and engaged by smiling and making eye contact. They also looked at the piano.
Researcher's thought process and action:	Since the children had become able to tolerate my input of holding their hands to press down the keys, the next stage was to encourage them to produce the sound independently. I released

	their hands and prompted them to press down the keys on their own.
Children's reactions:	When I released her hand, Child 1 did not manage to press down the keys by herself. On one or two occasions, she seemingly tried to press down the keys by putting her hands on the piano. However, due to her weak muscles and poor gross motor coordination, the piano produced no sound. The child then started to knock on the piano. After I released his hand, Child 3 pressed down the keys on his own. In the last two sessions, the child seemed reluctant to press the keys on his own.
Analysis:	Child 1 was unable to produce the sound on her own and expressed no understanding of its production, although such inability may have been due to the weakness of her fingers and hands. Subsequently, she decided to knock on the piano instead. Her intention behind this action was unclear to me, so I had to interpret the gesture. Since Child 1 was unaware of how to produce the sound from the piano and, because of the weakness of her fingers, could not produce the sound by pressing down the keys. Therefore, she sought other ways to 'play' the piano – in this case, knocking on the piano with her fingers. Regarding Child 3, who performed remarkably well throughout the activity but became reluctant to engage independently towards the last session, it is possible he was simply accustomed to having me play for him or disliked pressing down the keys himself.
Researcher's thought	The evidence above could suggest that Child 1 needed more time

process and action:	to develop strength and an understanding of how to produce sound on the piano with her fingers. Therefore, I continued with the current strategy to meet these goals. In addition, I provided her with continuation opportunities to encourage her to produce the sound on her own. Child 3 likes the sound of the piano and assumed a proactive role in controlling my hand to play his desired sound. With this in mind, I allowed him to push my hand down to play the keys, and when he stopped, I would stop as well until he pressed my hand down to play the keys again. Through such scaffolding, I managed to get the child to participate actively in the activity and indirectly produce sounds on the piano through me, which can transfer skills to help him press the keys by himself.

Table 26. Scenario 3

Children's action:	The children produced sounds on the piano without support from me.
Analysis:	Children 2 and 4 could not tolerate input. However, they liked to produce sounds on the piano without support from me. This evidence suggests that awareness of sound emerged, and the children intentionally produced sound. Nevertheless, they seemed to seek a response from me; for instance, after gliding across the keys, Child 2 would stop and wait for me, and when I glided back, he would follow.
Researcher's thought process and action:	In this scenario, the children already knew how to produce sounds on the piano. Thus, to illustrate cause and effect, I adapted the strategy with an interactive activity to teach the children how to

	alternate turns. Bearing in mind that no imitation had taken place yet, I turned the activity into an interactive play between the children and me. When the children made a sound, I provided an appropriate response, such as making a sound back or imitating the sound, to reinforce the children's awareness that their actions can have an effect.

In summary, strategy P.2.A.1 was effective in teaching children to produce sounds on the piano by providing teacher support and then allowing the children to explore independently.

4.3.4 Interactive: Element A

DeNora (2000) and Turino (2008) opined that music making is a social process, as it involves a variety of participants with diverse roles, such as that of an individual or collaborative performer, a composer or a listener. Although music making can be undertaken alone, children with ASC benefit from music sessions that offer a unique and secure framework for experiencing and developing many skills and disciplines of social interaction (Ockelford, 2013). This is especially true for sessions that are undertaken on a one-to-one basis, wherein the teacher and child work in close proximity and thereby form an intimate connection between the shared activity in the relationship between the adult and the child (Ockelford, 2013).

Shared attention is a significant notion, as children with ASC who display a deficit in social interaction can benefit from participating in one-to-one music sessions. This applies to piano teaching in which the teacher works in close proximity with the student. By concentrating on the process of producing simple sounds on the piano, the teacher and child are attuned in their attention, which promotes interactive play. Research reveals that joint attention is associated with expressive language

development (Mundy, Sigman & Kasari, 1990; Adamson, Bakeman, Suma & Robins, 2017), and some children with ASC experience a delay in expressive language. Therefore, music could be particularly effective to support progress in early social interaction.

When a child at SoI Level 2 initiates sound making, the teacher can reinforce his or her awareness of cause and effect by providing appropriate responses, which can in turn advance their cognisance of a sentient 'other' (Ockelford, 2013).

Strategy 1 (I.2.A.1)

The teacher plays on the piano and allows ample time for the child to respond while occasionally providing prompting, such as physical gestures, simple verbal instructions, calling the child's name or stating a simple word, e.g. 'go'. The teacher can make sounds on the piano that the child has experienced previously.

This strategy uses the piano as a medium to create a variety of sounds with the aim of generating responses from the child. Such responses can lead to interactive play, such as taking turns. Notably, imitation does not take place here. Cause and effect is the focus to supporting the child in understanding the relationship between events and the consequences. The child may respond in different ways, such as using facial expressions, body language or vocalising. The anticipated benefit of these strategies is that the child learns to take turns in playing the piano.

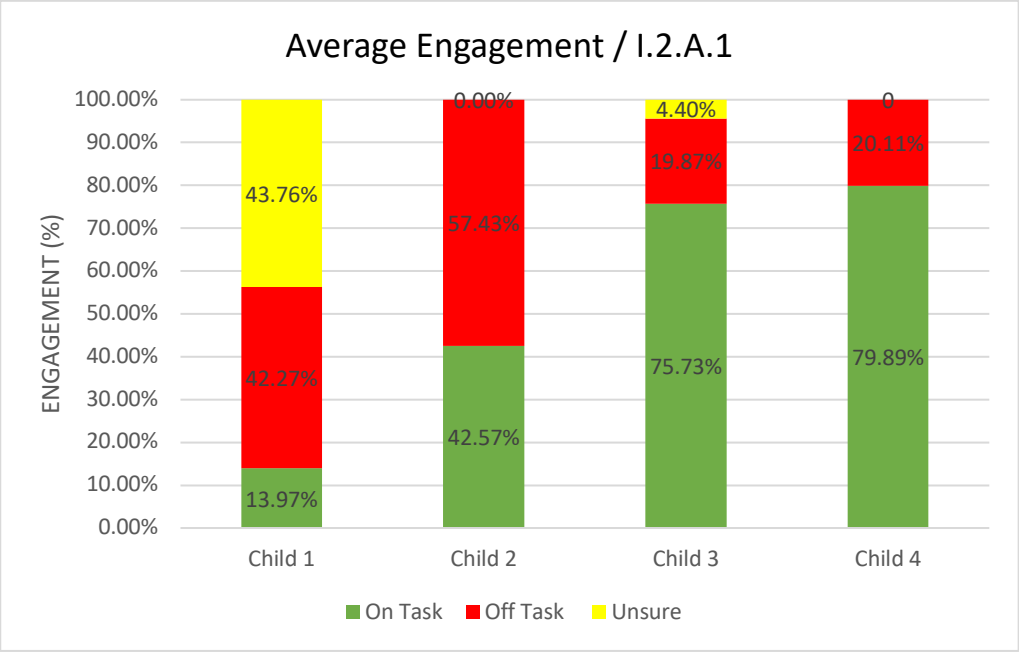


Figure 11. Average engagement of Child 1, Child 2, Child 3 and Child 4

According to Figure 11, Children 3 and 4 had the highest engagement and were more interactive than Children 1 and 2. I only implemented the interactive strategy in the last two sessions for Child 1 because she was more reactive and did not proactively make a sound; therefore, I concentrated on playing sounds to provide a listening experience and on the kinaesthetic modality to impart awareness that the piano is capable of producing sounds. The following two scenarios were compiled from the events of the children's engagement:

Table 27. Scenario 1

Researcher's action:	I implemented I.2.A.1 by making a sound on the piano and waiting for the child to respond. I chose to make a sound to which the child had responded fondly.
Child's reaction:	The child ignored my action.
Analysis:	In this scenario, it seems that the children had no understanding of the concept of interaction. In this regard, research supports that children with ASC exhibit social deficits, including difficulties with

	initiating interaction, responding to initiations made by others and maintaining social engagement (Koegel, Koegel, Fredeen & Gengoux, 2008; Watkins et al., 2015). Therefore, it was typical for the children to ignore my playing. This goes in line with Terzi's notion of capability: each child has a different cognitive ability, functioning profile and a range of learning needs. Moroever, learning pace could also affect the child's learning. It may be that the children needed more time or additional sessions to grasp the concept of cause and effect.
Researcher's thought process and action:	As the children were yet to establish the concept of cause and effect, it was crucial to establish joint attention to scaffold them in understanding cause and effect. For instance, I used prompting to cue them to play after I had played, or I provided sufficient time for the child to respond. I could also mould the interaction by imitating the child's production of sound or behaviour (similar to I.2.B.1) with the assumption that the child was seeking a response.

Table 28. Scenario 2

Researcher's action:	I implemented I.2.A.1 by making a sound on the piano and waiting for the child to respond.
Children's reactions:	Child 1 reacted through vocalisations, hand flapping and knocking on the piano. Child 2 reacted by gliding the keys with his fingers and banging on the piano. Child 3 reacted by pressing the keys (trying to imitate me on one or two events), pulling my hand to the sound that he wanted and pushing my hand down to play.

	Child 4 reacted by imitating my playing.
Analysis:	The responses from the children varied. Children 3 and 4 imitated my playing. Level 2 of SoI development does not address imitation. Cause and effect is the primary concept, which teaches the child the relationship between events as well as their consequences. I provided ample time for the children to respond, and they could respond in various ways. Child 1 demonstrated a low percentage of 'on task' behaviour, which suggests that she did not engage much when I implemented the strategy. However, the category of 'unsure', which has 43.76% average engagement, implies that Child 1 may have been interacting with me through other means, such as vocalisations and hand flapping. One should consider that the piano was a new instrument, and these children had no prior concept of its mechanism. Therefore, children may have responded differently or interacted through their own means, such as vocalisations, body gestures, facial expressions, banging on the piano or gliding their hands on it.
Researcher's thought process and action:	Given that all children are unique, I planned the materials accordingly: I knocked on the piano to initiate a response from Child 1, glided my fingers across the keys to initiate a response from Child 2, allowed Child 3 to pull my hand to indicate which sounds to play and continued an imitation game with Child 4. Time and proper scaffolding are imperative to teach the children the concept of cause and effect in the context of their actions. Impaired development of joint attention is a dominant feature of children with autism, but piano activities can build this skill and promote well-

	being.

4.3.5 Interactive: Element B

This section describes how the children made sounds with the expectation that they would stimulate sound production by another person.

Strategy 1 (I.2.B.1)

The teacher works under the assumption that the child seeks a response to the sound that they make and immediately provides an appropriate response.

This assumption applies when the child pauses after making a sound or engages the teacher through eye contact and gestures. Even if the intention of the child is not clear, the teacher should provide an appropriate response, since the process requires many repetitions to illustrate cause and effect for the child.

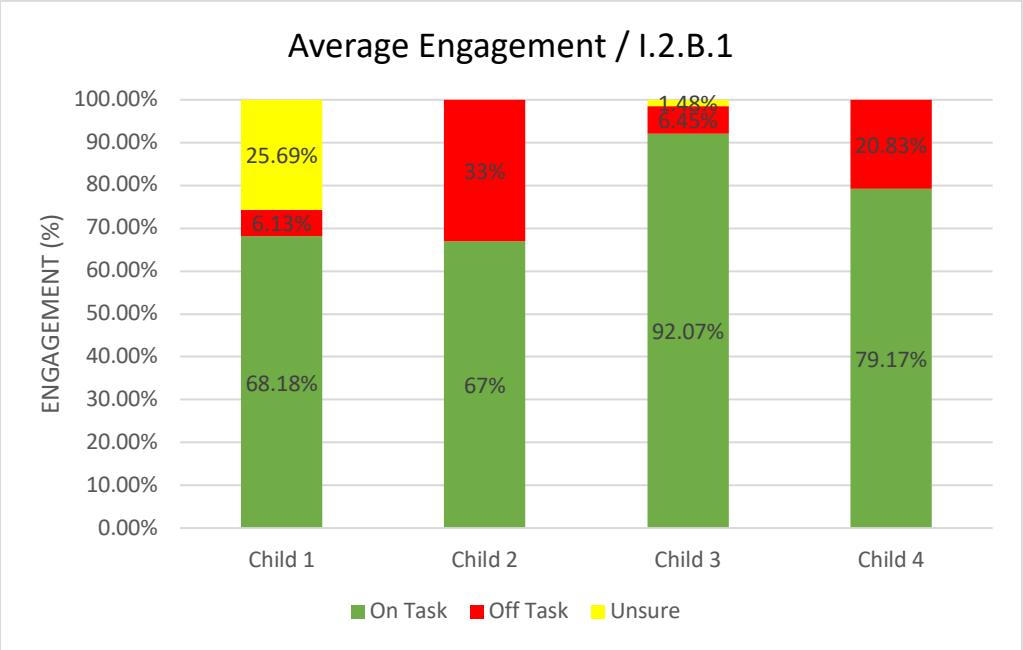


Figure 12. Average engagement of Child 1, Child 2, Child 3 and Child 4

Figure 12 evidences that all children apparently enjoyed the interaction. With this strategy, I assumed that children sought a response to the sounds that they made, and I provided an immediate and appropriate response, such as imitating the sound in

return. The scenario from the children's engagement follows:

Table 29. Scenario 1

Child's action:	Child 1 pulled my hand towards the piano, vocalised and flapped her hands. Child 2 glided across the keys and paused. Child 3 pulled my hand towards the keys and pushed my hand down to play the piano. Child 4 played on the keys, paused and looked at me.
Researcher's thought process and reaction:	I assumed from these gestures that the children were seeking a response. Therefore, I provided the following immediate responses: For Child 1, I played the keys when she pulled her hand towards the piano. When the child vocalised and flapped her hands after I stopped playing, I matched her vocalisation on the piano (high pitch = high sound; vocalised three times = played three times on the piano) and paused and waited for her response again. With Child 2, I glided across the keys and paused for the child to react again. However, Child 2 did not always respond. I let Child 3 control my hand and sometimes deliberately played the wrong sound so that the child would initiate the interaction again. With Child 4, I imitated back the same keys and paused to allow the child to respond. On occasion, I cued the child in playing by pointing towards the keys.
Analysis:	I offered appropriate responses to help the children understand the concept of cause and effect (Ockelford, 2013). The children

	functioned at stage two of their development of human communications, which is termed the 'intentional' stage. Accordingly, the children attracted my attention by initiating a sound or using body language and gestures to wait for a response. Consequently, they become aware that their actions can cause an effect.

4.4 Musical development of the children in the SoI framework

The progress of the musical development of three children was mapped on the SoI framework using the software provided on the SoI website (www.soundsofintent.org). The underlying assumption is that effective strategies promote the musical development children. The results are presented in the three graphs below.

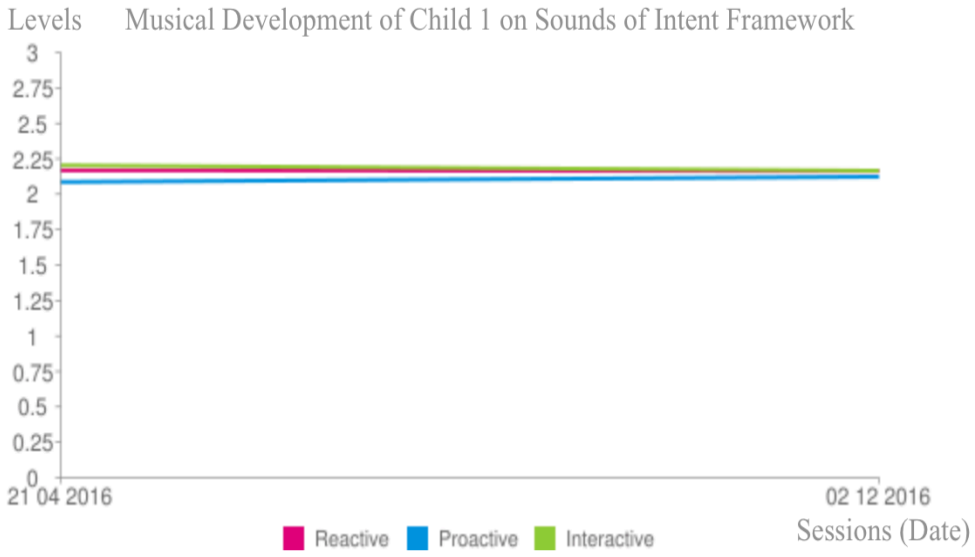


Figure 13. Progress of musical development of Child 1 over the course of sessions

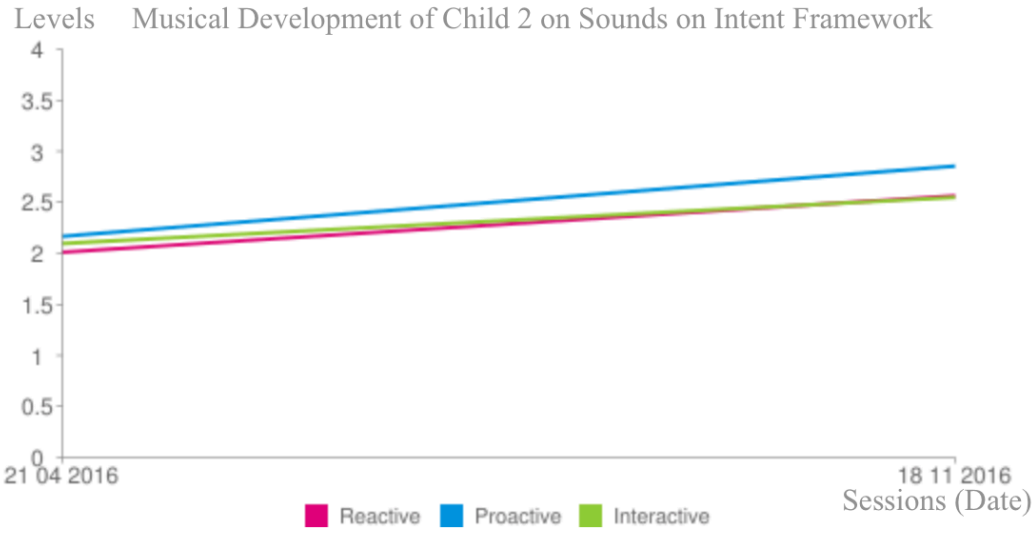


Figure 14. Progress of musical development of Child 2 over the course of sessions

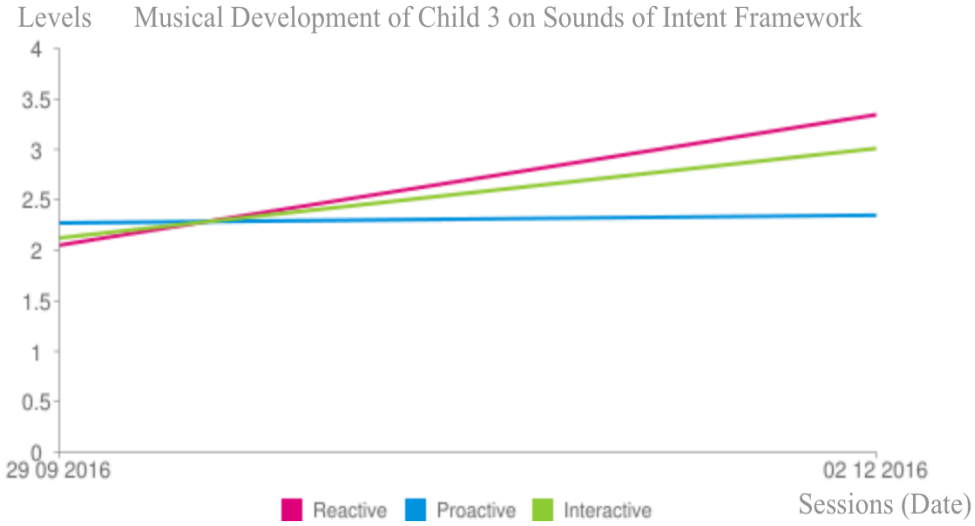


Figure 15. Progress of musical development of Child 3 over the course of sessions

The figures reveal an upwards trend in all three domains for the three children over the course of the sessions, although the increase for Child 1 in each domain is slight compared to those of the other two children. The underlying trend in this changing pattern of observations was gauged by comparing the means of the reported ranks on a session-by-session basis. The findings offer a proxy indication of changes in the children's perceived level of musical engagement.

An explanation for Child 1's musical development progress could be that Child 1 needs more time to react to the strategies or learn the new instrument. The positive trend in her progress supports the effectiveness of the strategies. For Children 2 and 3, it is noticeable that all three domains increased broadly.

These results strengthen Vygotsky's theory of scaffolding. By offering appropriate support in the initial stage of learning, children can learn to create and replicate the materials alone thereafter. The interactive aspects of both Child 2 and Child 3 also heightened, which supports the use of the piano to illustrate the cause-and-effect relationship in musical development and promote engagement. Working with children on a one-to-one basis necessitates shared attention. By concentrating on the process of taking turns, the attention of the child and I become attuned, which generates attention feedback within the space around the instrument. However, other factors may have affected the results and could include the following:

1. The children's growing familiarity with me and the routine of the sessions, which may have enabled them to more fully engage and interact musically over time;
2. My deepening knowledge of all three children, which may have enabled me to scaffold the children's interactions more effectively as the sessions progressed.

4.5 Discussion

In this project, I developed and tested three reactive strategies, one proactive strategy and two interactive strategies. This section discusses the findings.

4.5.1 Reactive

The strategies intend to help participants gain an awareness of sounds through both

auditory and kinaesthetic modalities. With strategy 1 (R.2.A.1), the engagement of the four participants varied and fluctuated. There are no clear trends in the quantitative data that reflects gradual increase or decrease of engagement. The disengagement of the child was then analysed with cognitive autism theories to explain the phenomenon. The analysis found that children on Level 2 had difficulty with engaging in the task, possibly due to sensory integration, which hinders the child from linking incoming data from different sensory modalities. Frith's WCC theory, wherein children have a tendency to focus their attention on parts rather than the whole, could imply that the children were distracted by the surrounding environment, which affected their behavioural responses in remaining on task.

As another explanation, children with ASC use the preconscious system to take in information and employ their senses peripherally (Bogdashina, 2016). Therefore, the children may not have appeared to be listening to the sounds and thus seemed disengaged from the task. Other studies often associate auditory processing disorder with individuals with ASC (Grandin, 2006; Bogdashina, 2016; Koegel & Schreibman, 1976). This disorder was evident in Child 1, who exhibited no awareness that the piano was the source of the sounds during the implementation of strategy R.2.A.1.

Strategy R.2.A.2 was developed to use kinaesthetic modality to complement the auditory sense. With this strategy, I employed the hand-under-hand technique to allow the children to 'feel' that the sound came from the movement of my hand playing on the piano. The results indicated significantly high engagement from Child 1, which was not apparent with R.2.A.1. Therefore, for children with ASC, sensory integration difficulties and no understanding of the production of sounds, an alternative learning modality can support awareness and recognition.

However, not every child was able to tolerate tactile input, as Children 2 and 4 were reluctant to place their hands on my hand to feel the movement. This condition of sensory intolerance (Bogdashina, 2016) renders some individuals with ASC intolerant of certain input. Overall, the strategies were effective in assisting the children in gaining awareness of sounds, as all four children met the success criteria of the piano curricular framework (see Chapter 3) after the sessions.

4.5.2 Proactive

The strategy in this domain incorporates Vygotsky's theory of scaffolding. The vision of scaffolding in this project included teacher support of the children's piano-learning experiences by way of an appropriate groundwork to develop and enable the child to successfully produce sounds on the instrument. When children are first introduced to the piano, they have no knowledge of how to produce sounds on it. After gaining awareness of this capability, their teacher should then support them in intentionally producing and controlling the sounds.

The only strategy that was developed in the proactive domain uses the kinaesthetic modality to help the child press down the keys. This project was the first in the field of piano pedagogy to utilise the piano as a sensory tool rather than as a traditional musical instrument to promote musical skills in early musical development. The strategy uses the piano as not only a sound producer but also a tool to allow children to experience the multisensory nature of the piano. The quantitative results for Children 1, 2 and 3 do not reveal a clear trend of increasing or decreasing engagement, as their engagement fluctuated throughout the sessions. Only Child 4's results reflect an upwards trend in engagement that approaches Level 3 of musical development. Although the trends were inconclusive, all four children demonstrated high engagement in the task, which suggests that the strategy was effective.

Children 2 and 4 were unable to tolerate the input, so I implemented the strategy gradually to allow ample time for the children to create sound on the piano and accept my assistance. However, at the start of the sessions, Children 2 and 4 were already able to produce sounds on the piano, as they banged on the piano as I played it while implementing R.2.A.1. Since the children could produce sounds, I applied the strategy to assist the children in exploring multiple touches to create sounds on the piano. Overall, the strategies were effective with Children 2, 3 and 4, who all met the success criteria of the piano curricular framework by producing sounds without physical prompting.

Child 1 was the only participant who struggled to produce sounds independently. This challenge could be explained as follows:

1. Children with ASC who have severe learning difficulties exhibit poor executive function (Hill, 2004; Gray et al., 2012) and delay in fine motor development (Leary & Hill, 1996; Ozonoff et al., 2008; Lloyd et al., 2013). Weak muscles and poor gross and fine motor skills could have prevented Child 1 from producing sounds independently.
2. Child 1 was still becoming aware of sounds produced on the piano and therefore could yet not intentionally produce them. According to Ockelford (2009), while developing the SoI framework, the team noticed that the proactive strand could never precede the equivalent reactive stages. Thus, the intentionality in sound production would not occur before the development of an awareness of sound. Child 1 may require extra sessions and time to develop the skills to produce sounds on the piano.
3. Skill development was based on the child's physicality and medical condition and their functional implications. Child 1 might still be at an early stage of her

functional development and require more time to establish the skills compared to Children 2, 3 and 4.

4.5.3 Interactive

This project developed and tested two strategies in the interactive domain. It involved the first use of the piano as a resource for engaging children with ASC to promote interactive play and promote musical skills. Because the consistency of the piano can clearly illustrate cause and effect in the early stages of musical development, it can serve as a suitable tool for teaching the concept. Shared attention is a significant notion in this context, as children with ASC who display a deficit in social interaction can benefit from one-to-one music sessions. Shared attention applies to piano teaching in which the teacher works in close proximity with the child and concentrates on the process of producing simple sounds on the piano. The attention of the teacher and child are attuned, thus promoting interactive play. Research associates joint attention with expressive language development (Mundy et al., 1990; Adamson et al., 2017), and some children with ASC exhibit delayed expressive language. Therefore, music could be particularly effective in developing early social interaction skills. The implementation of strategy I.2.A.1 reflects an upwards trend of engagement for Children 3 and 4, which suggests that both children started to respond and interact with me.

4.5.4 Summary of Musical Profile of Children 1, 2, 3 and 4

Table 30 presents the engagement of each child with each strategy. Based on the average percentage of their engagement, I categorised the engagement into three levels and represented each with a different colour: green for high engagement (70-100%), yellow for average engagement (40-69%) and red for low engagement (0-39%). The colour system provides readers with a rich visual representation of the engagement of

each child with each strategy over the course of the sessions. The table also indicates if the child has successfully fulfilled the criteria that were set in the piano framework, and it illustrates the use of a combination of strategies as well.

The overall results in Table 30 suggest that the strategies effectively promoted musical skills among children with ASC who have severe learning difficulties. Two participants (Children 3 and 4) met all of the success criteria of the piano framework (see Chapter 3). Child 1 could not yet independently produce sounds on the piano or to respond to different types of sound that I made, and Child 2 could not yet differentiate types of sound. All four demonstrated progress in their musical development (see Section 4.4), which further implies that the strategies were effective in promoting musical skills.

Table 30. Summary of engagement of Children 1, 2, 3 and 4

Level 2							
Domains	Reactive			Proactive	Interactive		
Strategies (Modalities)	R.2.A.1 (A)	R.2.A.2 (K.A)	R.2.B.1 (A)	P.2.A.1 (K.V.A)	I.2.A.1 (V.A)	I.2.B.1 (V.A)	Combination of Strategies
Child 1	●	●	●	●	●	●	N/A
Success	Y		N	N	N	Y	
Child 2	●	-	●	●	●	●	N/A
Success	Y		N	Y	Y	Y	
Child 3	●	●	●	●	●	●	N/A
Success	Y		Y	Y	Y	Y	
Child 4	●	-	●	●	●	●	N/A
Success	Y		Y	Y	Y	Y	

Notes: A=Auditory modality, K=Kinaesthetic modality, V= Visual modality, Y=Yes (use of combination of strategies, N/A=Not applicable ● Engagement 70-100%, ● Engagement 40-69%, ● Engagement 0-39%, box with (-) =did not use the strategy, Y= met success criteria on the piano framework and N=did not meet the success criteria.

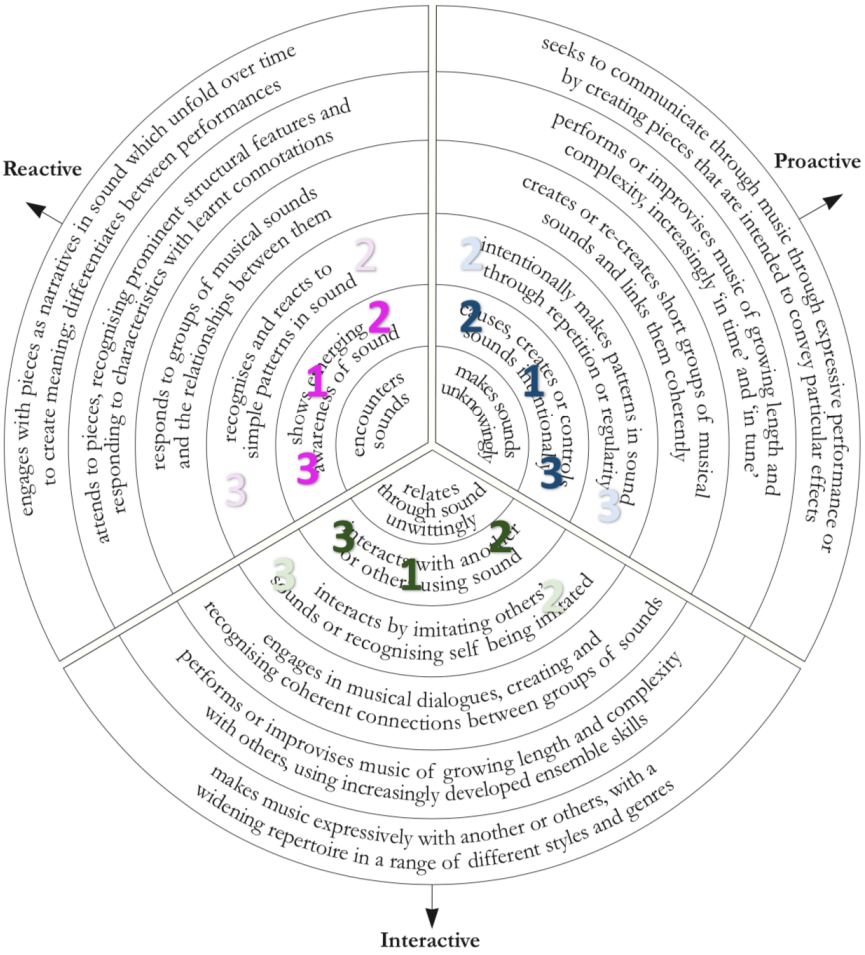


Figure 16. Concentric profile of Child 1, 2 and 3

Figure 16 provides concentric profiles of each child to demonstrate the pattern and relative frequency of the occurrence of musical behaviours that were observed during the lessons. The concentric profile reinforces a potential feeling of growth and visually displays evidence of the 'evolving intentionality and agency' among the children (Ockelford, 2008, p.81). The relative frequency was categorised into five levels of concentration, and a colour grading-system was assigned to show the engagement of the children (see Table 31). The chosen colours for each domain followed the colour scheme of the original SoI framework. The graduated colour system provides a rich visual representation of the child's musical behaviour, with a darker colour signifying a higher occurence. In addition, each child is represented by a number in the concentric profile (e.g. Child 1 – 1, Child 2 – 2). Table 32 presents a stack profile of each child.

The stack profile provides a different graphical representations of the children's musical behaviours. For the stack profile, the percentage of the occurrence of the musical behaviour is indicated.

Children 2 and 3 demonstrated progress in their concentric profiles, as their musical behaviours moved towards the outer circles in the reactive, proactive and interactive domains. Although Child 1 remained in the same circle, the child still achieved some progress. In the piano pedagogical context, Child 1 exhibited a progression from not knowing the piano is capable of making sound (i.e. no response for the first few lessons and unable to make sound on the piano) to engaging with the sound that was made from the piano (i.e. moving with the sounds) and attempting to make sound on the piano (i.e. knocking on the piano). These developments evidence that prociding appropriate strategies that are suitable for a child's capabilities can foster usical development at an early stage.

Table 31. Graduated colouring system of relative frequency

Relative Frequency %	1-20	21-40	41-60	61-80	81-100
Reactive					
Proactive					
Interactive					

Profile of Child 1					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	100	P2	100	I2	100
R3	0	P3	0	I3	0
R4	0	P4	0	I4	0
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 2					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	90	P2	84	I2	92
R3	10	P3	16	I3	8
R4	0	P4	0	I4	0
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 3					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	88	P2	97	I2	90
R3	12	P3	3	I3	10
R4	0	P4	0	I4	0
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Table 32. Stack profiles of Child 1, 2 and 3 over the course of the sessions

4.6 Conclusion

The rate at which the children developed musically varied in the three domains depending on their musical ability and functioning level (see Figure 16). For instance, Child 2 was more engaged while producing sounds on the piano (proactive), which increased the proactive domain in particular, while Child 3 was more engaged in interacting with me, which contributes most to the interactive domain.

These findings reinforce the multidimensional nature of progress in musical development. The attainment of each domain varies based on the child's interest, functioning level and musical ability. In general, children who function at Level 2 are in the early stages of musical development, so it is essential for the teacher to provide them with substantial support in gradually learning musical skill through the piano.

Chapter 5. Level 3 Results

5.1 Introduction

This chapter discusses the outcome of strategies that were applied for SoI Level 3 participants. Its layout follows that of Chapter 4, and the methodology is detailed in Chapter 3.

5.2 Background of participants

5.2.1 Child 5

Child 5 is a male from Sierra Leone who was nine years old at the time of the research. He has been diagnosed with ASC with severe language and communication difficulties. He was born premature with chronic lung and heart conditions, and he communicates mainly through gestures, body language and vocalisations. He is working towards using PECS for communication. Child 5 needs one-to-one support when participating in activities, as he can be especially physical and hurt people around him. He also exhibits tactile defensiveness and can be reluctant to touch objects. He has weak motor skills and undergoes therapy to strengthen his muscles and use his hands more effectively. His music teacher provided a brief behavioural and musical description:

> Child 5 is a very interesting kid. He has slight behavioural issues; he likes to leap up and down and will run around during music lessons. The teaching assistant will need to be with him all the time. He likes experimenting with knocking on the board with a stick. He is sensitive to loud sound and will need headphones to stop sensory overloading. He seems to be very motivated in piano. During music lessons, he will wander up to the piano and look at what I am playing and will start to press the keys on the piano. There were times that I felt like it might

develop into some sort of call and response.

5.2.2 Child 6

Child 6 is an Asian male with ASC who was nine years old when he participated in the project. Compared to other candidates, he is more cognitively able, and he can communicate in short sentences, although he does not always understand the meaning and often repeats others' sentences. He uses PECS to enhance his communication skills and could name certain objects and pictures when encouraged to communicate his needs or preferences. He often runs away if he does not want to engage in an activity, and he may spit or throw objects when agitated. However, he likes to engage in musical activities and enjoys singing. Below is a short description from his music teacher:

> Child 6 likes to sing songs, and he can sing in tune and on time. He is very motivated by music and will join in in every single song. However, he will randomly start crying sometimes. He is very proactive in music and likes to interact sometimes. He can take turns in a group.

5.2.3 Child 7

Child 7 is a Somalian male who was nine years old when he participated in the project. He was diagnosed with ASC but is quite cognitively able and can communicate with simple sentences. He likes to interact with others, but he has brief attention span and is easily distracted. The following is a short musical description from his music teacher:

> Child 7 is very proactive and interactive in music lessons. He will sing in the class, and sometimes he is able to lead a melody line. He likes to interact and play percussion instruments with others and is able to take turns in a group. He will, however, lose concentration quite

quickly or distracted by others, which interrupts what he was working on.

5.3 Results: Strategies in Level 3 SoI framework

In Level 3 of the SoI framework, children start to develop awareness of the possibility and significance of the relationships between the basic aspects of sounds, i.e. pitch and rhythm. In addition, they start to recognise the repetition of relationships and resulting regularity, both approximate and exact. It is believed that music cognition first emerges at this point. At Level 3, this project tested one reactive strategy, eight strategies in the proactive domain and four in the interactive domain.

5.3.1 Reactive: Element A

At Level 3 of the SoI framework, children start to recognise and react to simple patterns in sound. This development corresponds to Trehub's (2010) research on children's early cognition of musical sounds and structures, which notes that infants are capable of structural processing in the domains of pitch and perceived time. As children develop awareness of how sound is structured into music, their capacity to respond can also evolve. Through broad listening experiences, children may come to savour repetition and develop the capacity to anticipate changes in pitch, loudness, tone colour and tempo. Research suggests that a rich musical environment is significant for a child's nature and level of evolving abilities (Hannon & Trainor, 2007; Tafuri, 2017). In this context, repeated experiences can allow a child's skills to develop with appropriate scaffolding from an adult in accordance with Vygotsky's notion of ZPD.

The design of the piano offers immediacy and consistency of sound. Moreover, the symmetry of its black and white keys, which repeat their pattern every 12 notes,

provides a particularly useful medium for direct repetition and enables children to recognise basic patterns that can be produced. Children with ASC are fond of repetition, including in listening to music (Turner, 1999). I used simple verbal instructions to engage the children in the tasks and applied various learning modalities that were tailored and suitable for each child's learning. For example, I put letters on the piano to teach more visual learners about the repetition of keys on the piano.

Strategy 1 (R.3.A.1)

In this strategy, the teacher elicits responses from the child by playing sounds for which the child has demonstrated a preference, such as a particular note on the piano, or a chord. The teacher can also play the child's preferred repetitive nursery songs to motivate them to engage in the task.

In this project, children engaged through listening. Although children with ASC may appear to ignore stimuli and not concentrate on listening, they may actually be listening in an unconventional way and internalising the sound. However, depending on their functioning level, they may pay attention while the sound is played on the piano as well as look attentively at the source of the sound.

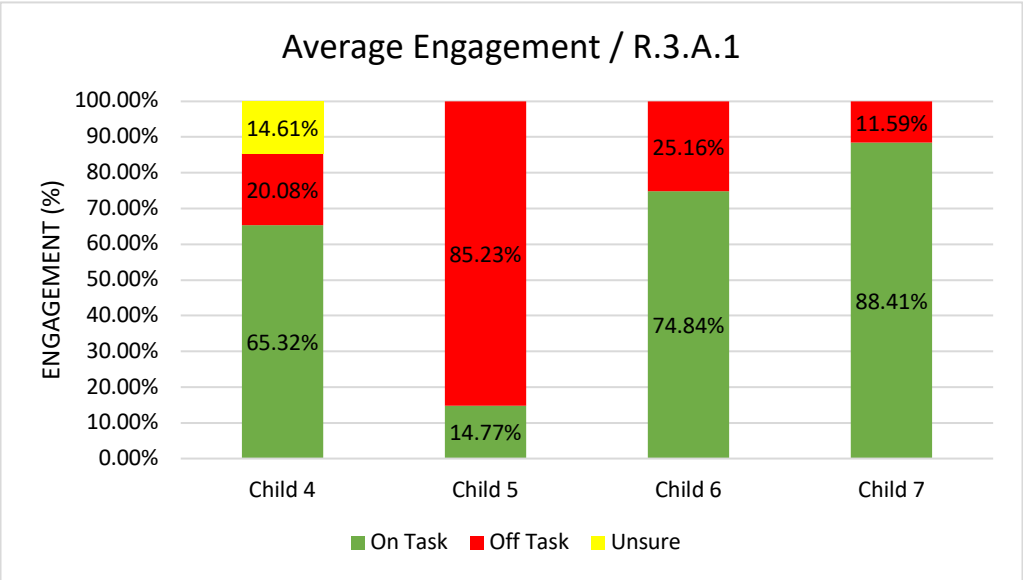


Figure 17. Average engagement of Child 4, Child 5, Child 6 and Child 7

Figure 17 indicates that, with the exception of Child 5, the children exhibited a high percentage of engagement in the task. Appendices D, E, F and G provide a detailed observational analysis for the children. While reviewing the data, underlying trends and patterns emerged among the children and were grouped into the scenarios below:

Table 33. Scenario 1

Researcher's action:	I implemented R.3.A.1 and played simple patterns on the piano i.e. repeated notes, an ascending and descending pattern of notes, repeated chords and nursery songs with repeated materials.
Child's reaction:	The children ignored the action.
Analysis:	While evaluating the reaction of the children, several possible explanations can be derived. First, some children with ASC experience difficulty with sensory integration, which poses a challenge in linking incoming data from different sensory modalities. This cognitive anomaly may be linked to Frith's WCC theory, which dictates that children tend to focus their attention on parts rather than the whole. Child 5 reflected this tendency, as he discovered the keyboard buttons and metronome display and started to obsessively press the buttons and call out the numbers while I conducted the piano lessons. Some children with ASC also have short concentration spans and easily become distracted. This characteristic was evident in all children, as each lost concentration at some point while I was playing the piano. Second, the child may not have liked the musical patterns that I played. For example, Child 6 would stop me from playing to

	request a song and start to throw a tantrum if I did not comply. Similarly, Child 4 covered his ears whenever low, repeated notes were played on the piano, which contributed to the percentage of 'unsure' engagement. Finally, the child's interest in the piano was an important motivational factor for engagement in the task. According to Mayes, Calhoun, Mayes and Molitoris (2012), children with ASC are able to concentrate on a specific task for a long period of time if they find it interesting.
Researcher's thought process and action:	In this scenario, I followed several approaches. If the child was distracted by objects in the class, such as the piano buttons and metronome, I covered the display and sound buttons before the next session to remove the distraction. If the child disliked the pattern that I played on the piano, I changed to a different pattern. In general, I maintained this strategy to offer a wide listening experience for the child, which could illustrate that the piano is capable of making repeated patterns, which structure music. Even though it seemed that the child could not attend to the sound from the piano, it was important to continue providing a broad listening experience. According to Ockelford (2013), listening is a valid form of participation and an essential part of the early music developmental stage.

Table 34. Scenario 2

Researcher's action:	I implemented R.3.A.1 and played simple patterns on the piano i.e. repeated notes, an ascending pattern of notes and descending

	pattern of notes, repeated chords and nursery songs with repeated materials.
Child's reaction:	The child engaged by looking at the piano and listening attentively and conveyed fondness through facial expressions. The child started attempting to imitate patterns or play on the piano with a regular beat as I played.
Analysis:	The evidence above indicates that the child eventually recognised simple patterns and structures in sound, which triggered an attempt to imitate the patterns and react to the regular beat.
Researcher's thought process and action:	Since the child realised that the piano can produce simple patterns, the next step is to adapt the strategy to be more proactive and scaffold the child to produce simple patterns on the piano.

In summary, strategy R.3.A.1 was effective in supporting the children in learning simple patterns on the piano. However, some participants did not listen or respond conventionally to the playing by sitting and listening attentively. For instance, Child 5 was mostly off task when this strategy was implemented. He was often distracted by external stimuli, such as playing on the controllers on the digital piano. Therefore, other strategies, such as more proactive or interactive ones, should be applied to assist such children with learning the piano.

5.3.2 Proactive: Element A

With element A, the child starts to learn basic pitches on the piano as well as the geographical design of the piano (groups of two black keys and three black keys; after every seven white keys, the pattern repeats itself). This stage involves no piano

technique; rather, it uses the piano as a resource or medium to assist the child in recognising simple patterns on the piano. The latter is a key foundation, as pattern recognition is significant in making music. With this basic concept, children can advance their skill in grouping the patterns into motifs (SoI Level 4) and, eventually, producing simple instrumental pieces or songs (SoI Level 5).

According to Haddon (2009), most piano teachers rely heavily on materials such as tutor books to structure their lessons. Uszler, Gordon and McBride Smith (1991) concluded that the most common content of these books concerns learning to read notation. However, this approach is unsuitable for children with ASC with learning difficulties, as they struggle with comprehension and thus lack the ability to read. While some can read letters and numbers, reading and processing notations and mapping them on the piano require a high cognitive level. The approach also requires fine motor control and coordination for the physical execution of sounds through sensory integration. Thus, individuals with visual impairment and other conditions may encounter obstacles in the conventional approach to learning the piano.

To accommodate all of these difficulties, this project applied strategies in accordance with Vygotsky's ZPD that combine visual, auditory and kinaesthetic modalities to scaffold the child to create simple patterns on the piano.

Strategy 1 (P.3.A.1)

This strategy uses visual labels to clarify the geographical design of the piano for the child. The underlying assumption is that the child has a basic comprehension of reading, such as the ability to read letters or numbers. The teacher points to the labels and names the keys. With the labels on the keys as visual cues, the child can associate the pitch with the label. Although the keys on the piano are conventionally named with

letters, there are other ways, such as the use of numbers, to introduce the patterns. This strategy is not a standalone strategy; rather, I used it in combination with another strategy to help the child recognise the simple patterns on the piano. Possible materials range from repeated single notes or ascending and descending patterns of notes to intervals of notes and chords.

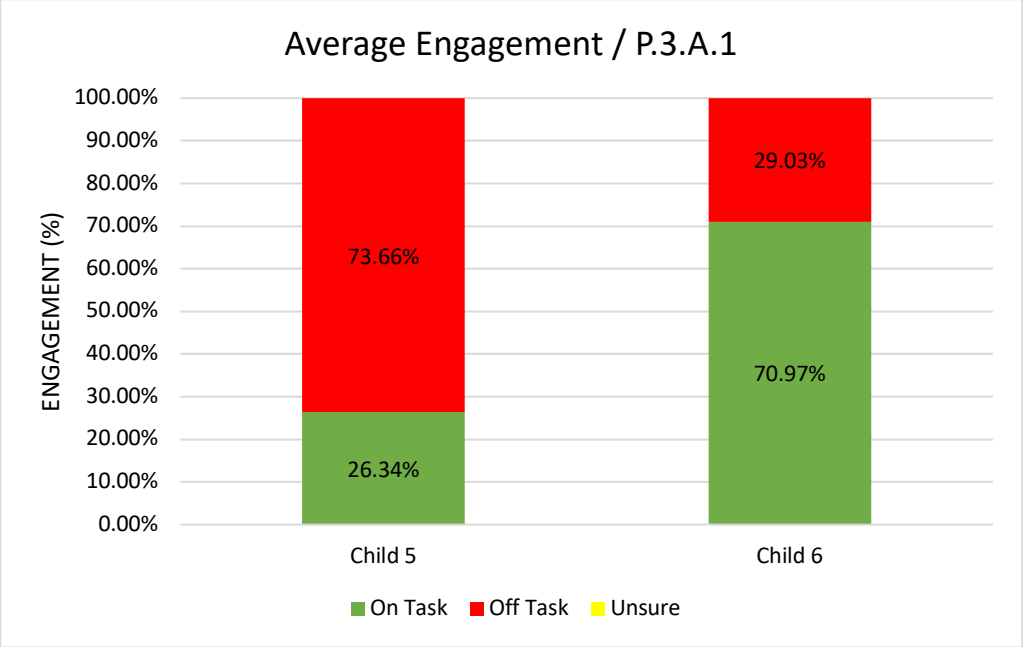


Figure 18. Average engagement of Child 5 and Child 6

Figure 18 indicates that I implemented the strategy with only two children. Since Child 4 had not developed reading comprehension according to his class teacher, he would therefore not understand the letters. Meanwhile, Child 7 was unable to tolerate the sensation of the sticker labels on the piano, so I had to remove them. The table below describes the scenario for the children's engagement in the task:

Table 35. Scenario 1

Researcher's action:	I approached this strategy in numerous ways to help the child recognise the patterns on the piano. Child 5 had not developed reading skills for letters and therefore did not recognise them; however, he was obsessed with numbers, so I labelled the keys

	with numbers instead. For Child 6, I used letter labelling combined with other strategies to support Child 6 in creating patterns on the piano. This labelling provided a complementary visual learning style, as several studies reported that children with ASC are 'visual learners' (Grandin, 2013; Ganz et al., 2012; Quill, 1997).
Child's reaction:	The children did not always engage in the task.
Analysis:	While implementing the strategy, I observed several occasions on which Child 5 engaged with the labels in the task, which helped him identify the correct keys to press once I pointed to them and named the numbers. However, Child 5 exhibited a high percentage of disengagement during the task, which was due to several factors. Since the child was distracted by the metronome display and the controllers on the piano, he constantly played with them. Even after I covered them, he managed to remove the cover. He also demonstrated behavioural challenges during the lesson by constantly disrupting the lesson with random talking as well as running away. Consequently, the teaching assistant had to be present to help with the situation. The level of engagement of Child 6 decreased. I only implemented the strategy for three lessons, as I noticed that the child had started to recognise the pattern on the piano. He could play an ascending pattern of notes and find the same notes in higher and lower octaves. However, he did not look at the label on the piano and named the letters incorrectly while playing the

	keys, but he nonetheless played the correct keys. I then realised that the child had not associated the letters with the keys, and he was still developing his reading comprehension. Therefore, I stopped implementing the strategy and changed to strategy P.3.A.2.
Researcher's thought process and action:	Based on these observations, I decided to change the strategy to maximise the children's learning and scaffold them to create patterns on the piano. To this end, I incorporated other learning modalities to clarify the patterns, which yielded the following two strategies.

Strategy 2 (P.3.A.2)

The teacher supports the child physically by holding the child's hand or using hand-under-hand or hand-over-hand techniques to create simple patterns on the piano. This strategy can be used in combination with strategy 1 (P.3.A.1) by combining visual, tactile and kinaesthetic modalities.

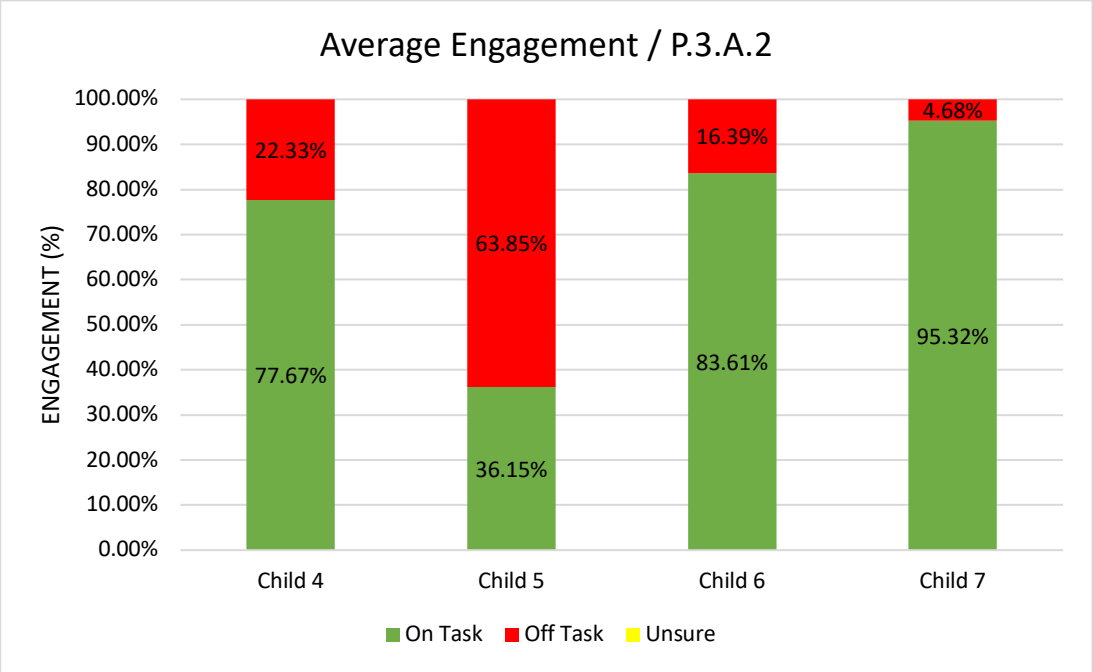


Figure 19. Average engagement of Child 4, Child 5, Child 6 and Child 7

As Figure 19 indicates, three of the four children exhibited a high percentage of engagement during the implementation of this strategy. However, Child 5's engagement (see Appendix 11) reflects an upwards trend, which suggests that he improved over time. With this strategy, I used the kinaesthetic modality to accommodate other learning modalities with the aim of helping the child create simple patterns on the piano. The scenarios of the children's engagement are as follows:

Table 36. Scenario 1

Researcher's action:	I implemented P.3.A.2 by holding the child's hand to create simple patterns on the piano.
Child's reaction:	The child could not tolerate the input.
Analysis:	The reaction above applied to all children in the group. They could not tolerate the input and pulled their hands away. This situation could signal tactile defensiveness (Baranek et al., 2005). However, tactile defensiveness does not seem to apply, as children were able to tolerate the input – just not for a long period of time. Possibly, they did not like extended sensations of touch or lost their concentration. Another factor could be a behavioural challenge, as evident in Child 4 (see Appendix10, with a drop of engagement in session 12) and Child 5. Child 4 felt unsettled and distressed throughout session 12, which affected his engagement on that day. Despite the behavioural challenges of Child 5, such as moving around the piano, playing with the buttons and trying to run away, he started to attend to the strategy and was more tolerant of me holding his hand.

Researcher's thought process and action:	Since not all children were tolerant of the sensation of touch or someone holding their hand, I modify the strategy so that the child can learn to play simple patterns without physical support (see strategy P.3.A.3).

Table 37. Scenario 2

Researcher's action:	I implemented P.3.A.2 and held the child's hand to play simple patterns on the piano.
Child's reaction:	The child tolerated the input and was able to play simple patterns without support from me.
Analysis:	This scenario applied to Children 4, 6 and 7. Evidently, the child started to tolerate the input from me, possibly because the child had become familiar with me or tolerant of the sensation of touch. Such scaffolding is successful in helping children recognise simple patterns on the piano, which can lead to independently creating simple patterns.
Researcher's thought process and action:	The child was able to create simple patterns without support, which indicates that the strategy is effective. The next step is to scaffold the child to imitate the patterns, which teaches the concept of cause and effect.

Strategy 3 (P.3.A.3)

Tactile defensiveness clearly precludes strategy P.3.A.2. Strategy P.3.A.3 requires the teacher to provide cues, such as pointing to or naming the keys, to direct the child to create patterns on the piano.

This strategy allows the child to avoid tactile sensitivity while still learning to create simple patterns. The strategy can be used in combination with an interactive strategy

(I.3.B.1) in which the child learns to imitate patterns. Not every child immediately understands the concept of imitation; by providing appropriate support, such as visual cues, a teacher can help a child to understand the relation between cause and effect.

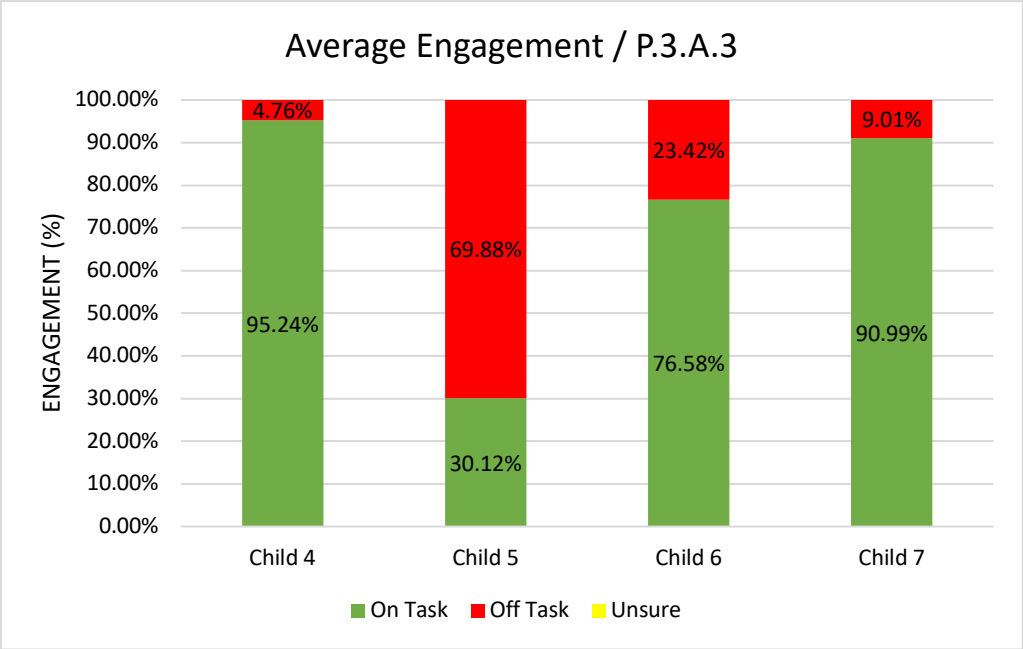


Figure 20. Average engagement of Child 4, Child 5, Child 6 and Child 7

Figure 20 displays that most of the children measured above-average (>50%) engagement, with the exception of Child 5, which suggests that the strategy is effective in helping children produce simple patterns on the piano. The strategy accommodates strategy P.3.A.2, in which children could not tolerate having someone hold their hand at all or for a long period of time. Table 35 presents the scenario of children's engagement in the task.

Table 38. Scenario 1

Researcher's action:	I implemented P.3.A.3 and used prompts and cues as well as pointing to or naming the letters or numbers to help the child recognise and create simple patterns on the piano.

Child's reaction:	The children did not engage in the task and was unable to create simple patterns when prompted. Child 5 mainly demonstrated this behaviour.
Analysis:	Joint attention is important in this context, which involves two participants actively sharing and monitoring each other's attention towards an object or event (Bruner, 1975; Jones & Carr, 2004). Research indicates that a deficit in joint attention is a core impairment of children with ASC (Baron-Cohen et al., 1992; Charman et al., 1998). Such impairment may cause a child to fail to respond to joint attention; in this case, the children failed to respond to the prompts, cues or labels of the letters and numbers on the keys. In addition, the task required visual processing of the prompts or cues in addition to auditory and information processing (naming the letters or numbers). Studies report that children with ASC exhibit a delay in processing (Hume, Loftin & Lantz, 2009; Bogdashina, 2016), which may cause them to be disengaged from tasks.
Researcher's thought process and action:	With the above considerations in mind, I switched between strategies with which the child was comfortable and tolerant to continue the task. This approach included combining two strategies, e.g. P.3.A.1 and P.3.A.3, to provide a clear visual representation of which keys to press. I also integrated all three strategies (visual, auditory and kinaesthetic) to teach the child to create simple patterns on the piano.

In summary, in proactive domain element A, all three strategies seemingly present strengths and weaknesses in helping children with ASC on Level 3 create simple

patterns on the piano. The results are inconclusive as to whether the strategies are effective for this goal, as many external factors could have affected the children's engagement, including behavioural issues, core impairment and concentration.

However, to evaluate the strategies in Element A, I examined the success criteria in the piano framework (see Chapter 3). Such criteria dictate that a strategy is effective if the child to whom it is applied becomes capable of generating simple patterns without physical prompts. All of the children accomplished this goal, which suggests that the strategies effectively taught the children to create simple patterns on the piano. However, there is no single strategy that fits all scenarios, and the teacher has to adapt his or her instruction to the child's learning and always observe the child's reactions.

5.3.3 Proactive: Element B

Once the child recognises that both the piano and music in general are composed of simple patterns, the strategy expands to reinforce the temporal structure of music. Research revealed that infants as young as two to five months olds can already distinguish between two simple rhythms (Chang & Trehub, 1977; Demany, McKenzie & Vurpillot, 1977). Moreover, babies between seven and nine months of age recognise rhythmic patterns even when the tempo and key are varied (Trehub & Thorpe, 1989). Children become more skilled at synchronising with a wide range of tempos as their cognitive processing improves in terms of, for example, attention and working memory, motor control, coordination and planning (Drake, Jones & Baruch, 2000). According to Slater, Tierney and Kraus (2013), music training improves beat-keeping abilities, which highlights the effect of experience. The core cognitive symptoms of individuals with ASC result from improper performance by the executive function system, which facilitates tasks such as working memory, planning and attention (Varela et al., 2017). Therefore, teachers should provide appropriate support to

scaffold children to recognise and create regular beats or simple patterns on the piano.

Strategy (P.3.B.1)

The teacher supports the child by holding his or her hand to create simple patterns, such as repeated notes or ascending and descending patterns of the keys, with a regular beat.

This strategy uses the kinaesthetic modality to assist children with feeling the pulse. In this phenomenon of 'kinaesthetic listening', listeners who are experienced in performing music feel the melody in their muscles and imagine playing the pattern that they hear (Keil, 1998). When the listener feels the beat and translates it into actual movement, such active movement evokes his or her perception of rhythm and, by doing so repeatedly, enhances their instinctive capacity for rhythm. Given the challenge of tactile defensiveness, I adopted strategy R.3.A.1 to create simple patterns with regular beats for the child to internalise and feel the beat before supporting them in playing the piano.

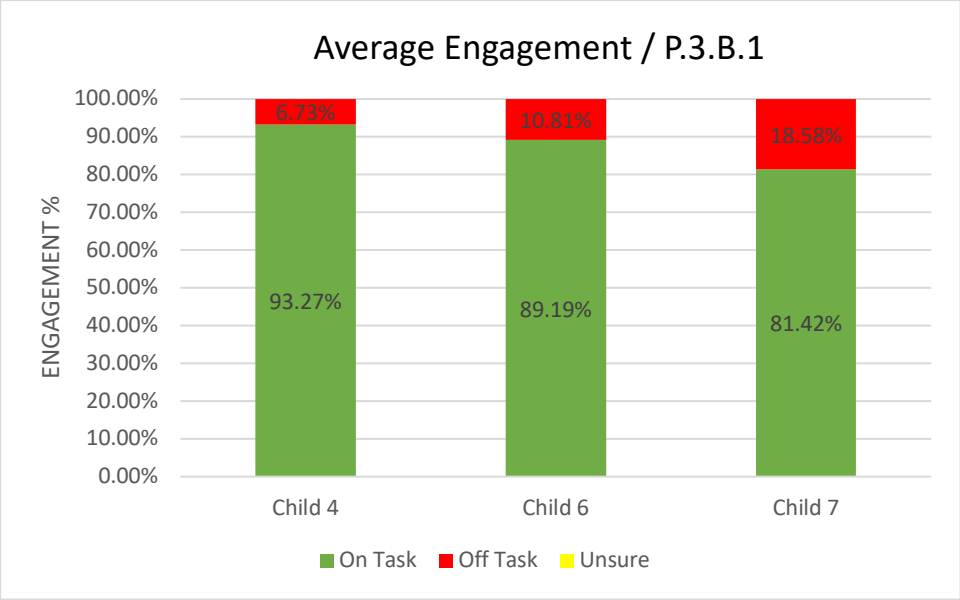


Figure 21. Average engagement of Child 4, Child 6 and Child 7

As Figure 21 illustrates, I implemented the strategy with only three children, as Child

5 having difficulty in maintaining engagement, and I dedicated much time to helping him recognise simple patterns before proceeding to recognition of regular beats. The gradual implementation of strategy corresponds to Terzi's notion of 'capability' (2005), which depends on the assessed abilities of the child. It is the celebration of each child's individual musical journey. The children registered high engagement on the task when I implemented the strategy, which implies that it is effective in helping children recognise regular beats on the piano. The table below contains the scenarios for the children:

Table 39. Scenario 1

Researcher's action:	I implemented P.3.B.1 by using physical support i.e. holding the child's hand, hand-under-hand or hand-over-hand to create simple patterns with regular beats.
Child's reaction:	The children could not tolerate the input throughout the action.
Analysis:	All children displayed periods of disengagement in the sessions In view of the increased engagement of Children 4, 6 and 7, this suggests that the children may have needed an adjustment period to become comfortable with someone else holding their hand and to overcome their tactile defensiveness.. Over time, the children started to tolerate the support. At the onset of their sessions, I noticed that Children 4, 6 and 7 already possessed a strong sense of regular beats, as I created repeated patterns with regular beats and the three children joined in by playing random keys on the same pulse. This response corresponds to early musical and movement development that Bergeson and Trehub (2006) and Patel and Iversen (2014)

	proposed, wherein beat perception is one of the most fundamental music-processing abilities that emerge in pre-school children and toddlers as young as two years of age.
Researcher's thought process and action:	Children at Level 3 developed a strong sense of pulse and were able to react to regular beats. By imparting this knowledge through a specific strategy, I reinforced the children's learning of the temporal structure of music. As Clayton et al. (2004) discussed, the motor system is not only responsible for producing rhythmic patterns but also involved in the perception of rhythm, which is known as 'entrainment', wherein pulses interact so the movement occurs at the same rate. This type of learning is apparent in Dalcroze's teaching of eurhythmics, which uses body movements to master musical rhythms. In the current scenario, I adapted this same concept by employing the kinaesthetic modality to teach the child to produce regular beats on the piano.

Providing proper scaffolding, such as by holding a child's hand to create regular beats on the piano, enables the child to feel through his or her hand movements and thus reinforces his or her perception of rhythm. The strategy demonstrated effectiveness, as the children were able to create repeated patterns with regular beats without support. However, since the children had already developed the recognition of regular beats prior to the strategy's implementation, the strategy might have merely reinforced the existing perception of rhythm rather than teaching it from scratch. While this strategy was effective in teaching the child, some children might not be able to tolerate the input (i.e. the sensation of touch); therefore, the teacher might need to alter the strategy to suit the learning needs of such children.

5.3.4 Proactive: Element C

Once children learn to form simple patterns on the piano, I can introduce how to achieve regular changes based on such patterns. This strategy expands their music-making experience by developing familiar materials. Notably, it differs from improvisation, wherein a musician creates a new musical composition through the use of simple materials. Such skill is practiced by individuals at Level 5 or above. With strategy 1 P.3.C.1, I illustrate that change can be achieved with simple, repetitive materials.

Strategy 1 (P.3.C.1)

The teacher uses simple patterns that the child already knows (e.g. repetition of notes, ascending and descending patterns, chords) and alters them by, for example, playing in different registers, in other keys, in higher or lower octaves or with an alternate hand. In addition to this demonstration, the teacher supports the child in playing by holding his or her hands.

This strategy combines visual, auditory and kinaesthetic modalities to teach children to create simple patterns through regular changes.

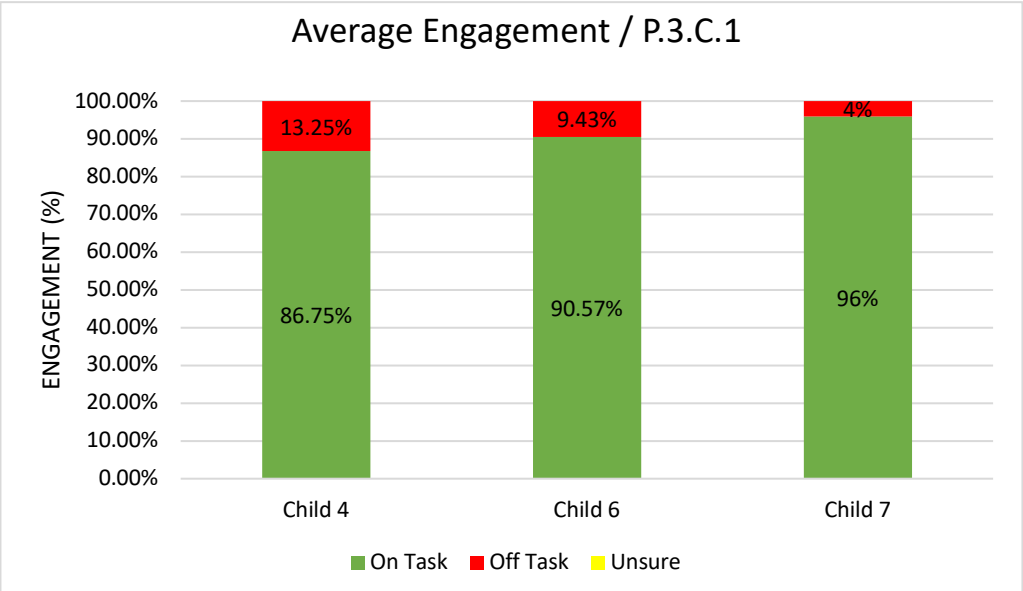


Figure 22. Average engagement of Child 4, Child 6 and Child 7

I did not implement the strategy in all sessions since achievement at higher levels depends on the accomplishments in those that precede them (Ockelford, 2013). To produce simple patterns with regular changes, children must first recognise the ability to create basic patterns on the piano. Only once the child grasps such an understanding can the teacher proceed to the task of making simple patterns through regular changes. Although I had a list of strategies to apply on the day of the piano session, the children's behaviours and reactions also affect the structure of the session. For instance, I may expend more time on regulating the child's behaviour, thereby losing time to implement alternative strategies, or the child may be focused on producing simple patterns and react keenly to other strategies, such as imitation (see I.3.B.1). All children exhibited high engagement in the task; although Child 6 displayed a downwards trend, it was due to feelings of distress over the course of the session and consequent reluctance to engage in later sessions. The following table presents the scenario for the children:

Table 40. Scenario 1

Researcher's action:	I implemented P.3.C.1 by holding the children's hand to support them in creating patterns of notes with regular changes. I chose familiar patterns that the children could already produce. The patterns that each child created were as follows: Child 4 liked to create simple patterns of repeated, single notes on the piano. I scaffolded the child to play the same notes up and down the piano. Child 6 enjoyed creating simple patterns of repeated notes and ascending patterns of notes. I supported the child in playing the same note up and down the piano and ascending patterns of

	notes on a different register. Child 7 possessed more cognitive ability compared to Children 4 and 6. He was able to create simple patterns and grasp the concept in his first session, and he was eager to play more on the piano. He could recognise the patterns of black keys on the piano, the keys of C, D and E on the piano, and create interval patterns of C and E. I supported him in playing the same set of black keys, the same note and intervals of C and E, all up and down the octaves.
Child's reaction:	The child tolerated the input but not throughout the entire action. However, at the end of the session, the children could play different patterns with regular changes without my help.
Analysis:	The strategy was effective in teaching the children to create simple patterns with regular changes. Although the children had no prior knowledge of the piano's structure and mechanism, proper scaffolding can instil knowledge of basic piano pedagogy by teaching about the keys and physical design of the piano. The child could not tolerate the input for a long period of time because of sensory overload, which caused them to shut down and disengage from the task.
Researcher's thought process and action:	For the child who did not like to be held, I changed to the following strategy (P.3.C.2), which uses cues and verbal instructions to clarify that music can make simple patterns through regular changes.

Strategy 2 (P.3.C.2)

Not every child with ASC can tolerate the input of me holding his or her hand. Therefore, this strategy involves cues i.e. pointing at or naming the keys to help children play the correct keys.

I implemented this strategy only with Child 6. Child 4 was not able to focus during the session, and the strategy of element C could not be applied during his last session. Meanwhile, Child 7 seemed to prefer that I hold his hand to play, as when I prompted him, he grabbed my hand and asked, 'This?' He then continued only once I was holding his hand.

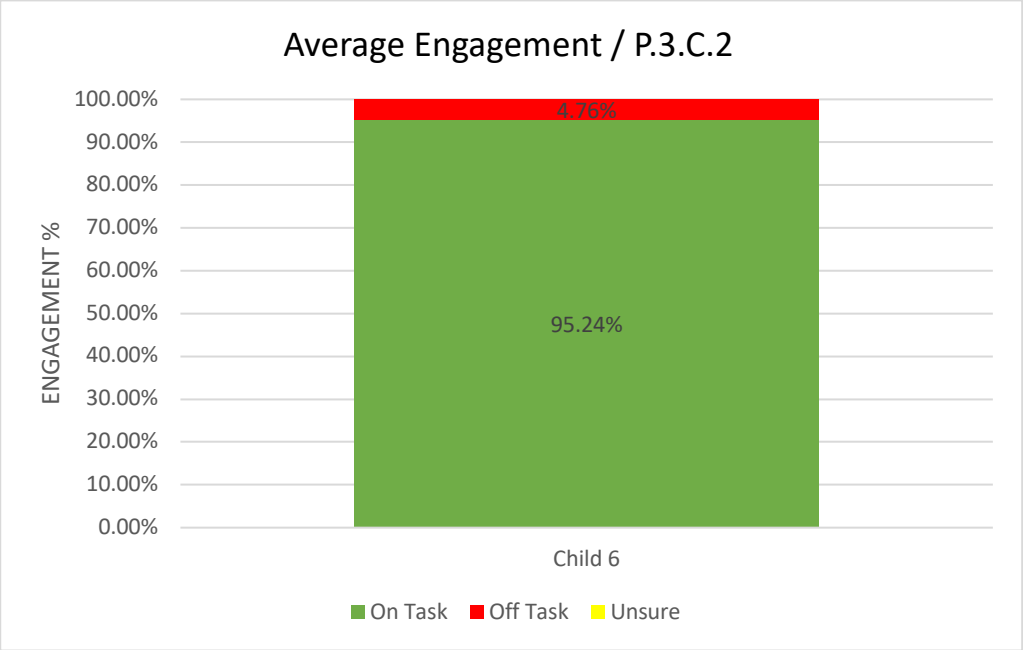


Figure 23. Average engagement of Child 6

Table 41. Scenario 1

Researcher's action:	I implemented P.3.C.2 when the child could not tolerate the input. I pointed to and named the key for the child.
Child's reaction:	The child played and imitated me by naming the keys. He then

	managed to play the patterns with regular changes without support.
Analysis:	The strategy is effective as a substitute for P.3.C.1 when children cannot tolerate the sensation of touch. Although the downwards trend suggests that the strategy might not be effective, there are some explanations for this decrease in the child's engagement,. Perhaps the child disliked the piano lessons or wanted to participate in another music session with the school music teachers in which the students perform dances and games with music.
Researcher's thought process and action:	I scaffolded the child to play simple patterns with regular changes by applying a suitable strategy for the child. By using prompting and cueing, this strategy avoided sensory overload of the child.

Once a child has mastered simple patterns on the piano, he or she can proceed to producing simple patterns with regular changes through the strategies that are outlined above. The teacher should always consider the learning modalities of the child and alter the strategy according to the child's needs. For instance, P.3.C.1 may not be a suitable beginning strategy for a child who exhibits tactile defensiveness. Rather, interactive strategy I.3.B.1 (see Section 5.3.5) is more effective to assist the child in imitating a pattern with regular changes, or P.3.C.2 can provide appropriate visual cues to help the child recognise patterns with regular changes.

5.3.5 Interactive: Element B

Imitation refers to a group of the same sound wherein one sound copies another in the context of potential variety on account of human agency (Ockelford, 2013). The

interactive domain assumes that the relationships between identical sounds in a series elicit responses from a child, thus leading to interactive activity in which the child imitates the sound from the teacher. Imitation in music requires several cognitive skills, including auditory processing, visual processing and motor control, to echo the patterns that the teacher plays. These skills are associated with the development of language, play and joint attention (Ingersoll & Schreibman, 2006).

Joint attention is relevant in this context, but studies reported that children with ASC have more difficulty than their peers do in performing skills that relate to joint attention (Schott, 2016; Carpenter et al., 2002). However, studies also suggested that joint attention behaviours emerge more often in children with ASC when music stimuli are present (Arezina, 2011; Kim et al., 2009; Yoo, 2010). Therefore, children might exhibit more joint attention ability during musical activities. For this element, I used imitation as one of the strategies to guide the child to create simple patterns on the piano. Besides promoting interactive play to improve joint attention, I employed the strategy to enhance the child's memory skills as well as accommodate other strategies in which the child demonstrated sensory integration difficulties. For example, I discovered that imitation was the most suitable strategy to teach children with tactile defensiveness to create simple patterns on the piano. The piano can also clearly illustrate the cause-and-effect relationship and is therefore suitable for building 'call and response' activities, wherein the child learns to imitate simple patterns that are played by the teacher.

Strategy 1 (I.3.B.1)

The teacher initiates interaction by creating simple patterns on the piano that derive from familiar material that the child has heard before. The teacher then pauses and waits for the child to imitate the same patterns in return.

The development of imitation skills begins in this strategy; therefore, children may not always imitate accurately. Approximate imitation may take place, wherein the child might imitate one accurate note or perform only a gesture of imitation. It is the teacher's responsibility to help develop the skill. This strategy can be combined with P.3.A.2 to physically support children in imitating the patterns or with P.3.A.3 by using cues to help children imitate the correct keys on the piano.

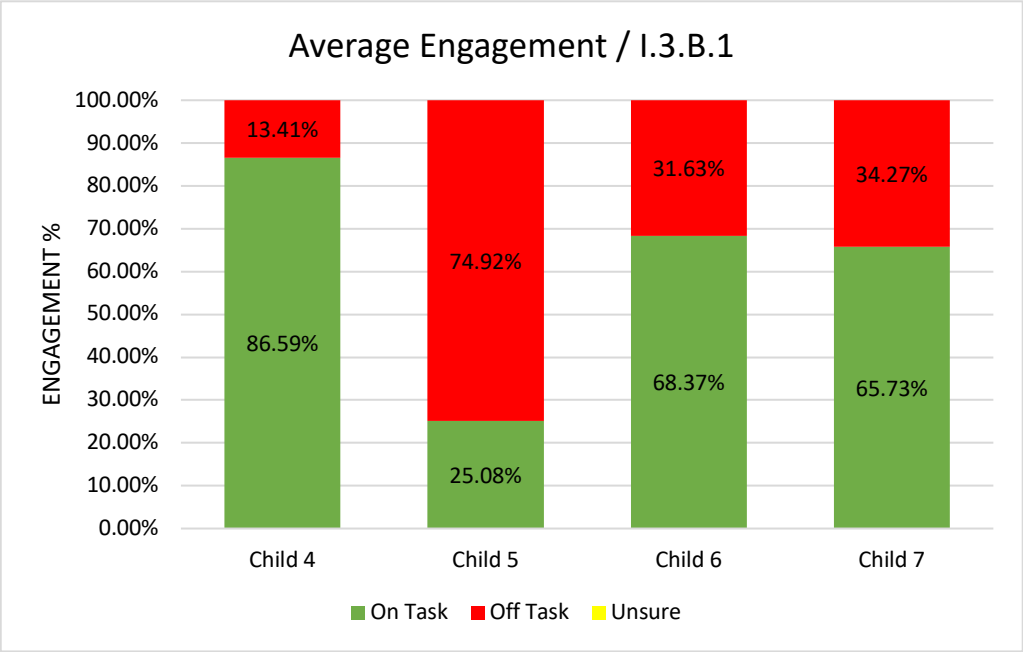


Figure 24. Average engagement of Child 4, Child 5, Child 6 and Child 7

Figure 24 depicts that all children were able to engage with the task and imitate my patterns. This outcome corresponds to Ockelford's zygonic theory (2013), which dictates that as a child develops awareness of the possibility and significance of relationships between single events (repetition patterns), the notions of 'same' and 'different' evolve in due course and clarify that, through imitation, one sound may derive from another. In implementing this strategy, I utilised the piano as a tool to initiate 'call and response' activities in which the child learned to imitate my simple patterns.

Table 42. Scenario 1

Researcher's action:	I implemented I.3.B.1 by playing a simple pattern on the piano and pausing to allow the child to imitate me.
Child's reaction:	The children imitated me.
Analysis:	This strategy can be used in conjunction with the proactive strategies to teach children to create simple patterns on the piano. It also complements strategy P.3.A.3, which I applied when the child's input intolerance necessitated an alternative approach. However, in the present scenario, I intended to not only assist the child in making simple patterns but also develop interaction and joint attention. The piano is a suitable instrument for these goals since pressing a key always yields the same effect. In this context, the children and I were attuned to each other as we shared the same space and activity.
Researcher's thought process and action:	Not all children are able to immediately comprehend the concept of imitation, which requires appropriate scaffolding and time. However, I noticed that the children at Level 3 in this project were able to imitate me at the onset of the session, although not always accurately. By providing appropriate support, the teacher can reinforce the concept of imitation for children.

Table 43. Scenario 2

Researcher's action:	I implemented I.3.B.1 by playing a simple pattern on the piano and pausing to allow the child to imitate me.
Child's reaction:	The child did not imitate me or imitated the wrong key.

Analysis:	Some research evidences that children with ASC struggle with imitation (Rogers, Hepburn, Stackhouse & Wehner, 2003). Imitation involves cognitive representation and visual-perceptual motor processing (Vanvuchelen, Roeyers & De Weerdt, 2007), and it is associated with the development of language, play and joint attention. Compared to their neurotypical peers, children with ASC have more difficulty with performing joint attention skills. Therefore, it is understandable that the children were not able to imitate me at first or imitated the wrong key, as they had not yet grasped the concept of imitation.
Researcher's thought process and action:	The child could not anticipate that I was pausing to wait for the imitation, so I provided visual cues, such as pointing to the exact keys, to support the child in imitating the patterns. Since the child still could not imitate me accurately, I returned to proactive strategy P.3.A.2 by holding the child's hand to play the correct note. Such appropriate scaffolding can reinforce the child's learning.

The children enjoyed imitating me and developed their understandings of the concept of imitation. Eventually, they could recognise the imitation of their own patterns.

5.3.6 Interactive: Element C

This element refers to the children's recognition that their own sound patterns are being imitated by others. However, because of the deficit in joint attention among children with ASC, they may not be able to recognise imitations of their own patterns. Performing many repetitions over time can advance a child's awareness of their own patterns of sound being imitated.

Strategy 1 (I.3.C.1)

When appropriate, the teacher imitates patterns in sound that the child has produced and waits for the child's reaction in order to provide an appropriate response in return.

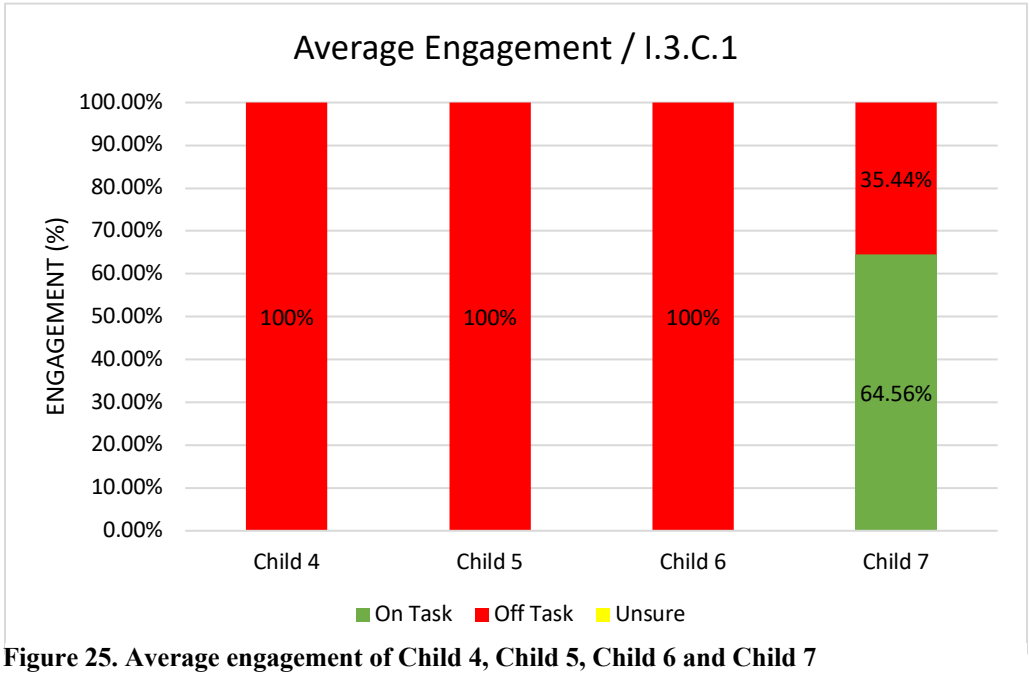


Figure 25. Average engagement of Child 4, Child 5, Child 6 and Child 7

Figure 25 conveys that Children 4, 5 and 6 had yet to recognise imitation of their own patterns. Thus, only Child 7 responded to the strategy.

Table 44. Scenario 1

Researcher's action:	I implemented I.3.C.1 by deliberately imitating the child's pattern and pausing to determine if the child had noticed that I imitated the pattern.

Child's reaction:	There was no reaction from the child. The child neither imitated in response nor looked at the source of the sound.
Analysis:	Child 7 gradually developed an awareness of his own sounds being imitated. However, Children 4, 5 and 6 had yet to develop the concept of imitation, and their deficit in joint attention obstructed their awareness that I was imitating their patterns. It is possible that the children did not understand the intention of the activity in which the imitation took place.
Researcher's thought process and action:	It is a complex process to understand the concept of imitation and become aware of one's own sounds being imitated. Therefore, I continued to implement the strategy despite the children's lack of awareness that I imitated their own sounds. Only through many repetitions of the process could the relation between cause and effect become apparent to the children.

Strategy I.3.C.1 was effective in helping the child understand the concept of imitation, which led to an awareness of one's own sounds being imitated. Imitation is a complex process which involves cognitive representation and visual-perceptual motor processing (Vanvuchelen et al., 2007). Some children with ASC and learning difficulties might not be capable of such a complex process; therefore, such children might need more time to engage in the task. The teacher may also alter the strategy to suit a child's learning needs by, for example, providing simple verbal instructions or visual labels for guidance.

5.4 Musical development of the children in the SoI framework

I used the software from the SoI website to map the musical development progress of all three children. The underlying assumption is that effective strategies enhance a

child's musical development. The four graphs below present the results of the progress.

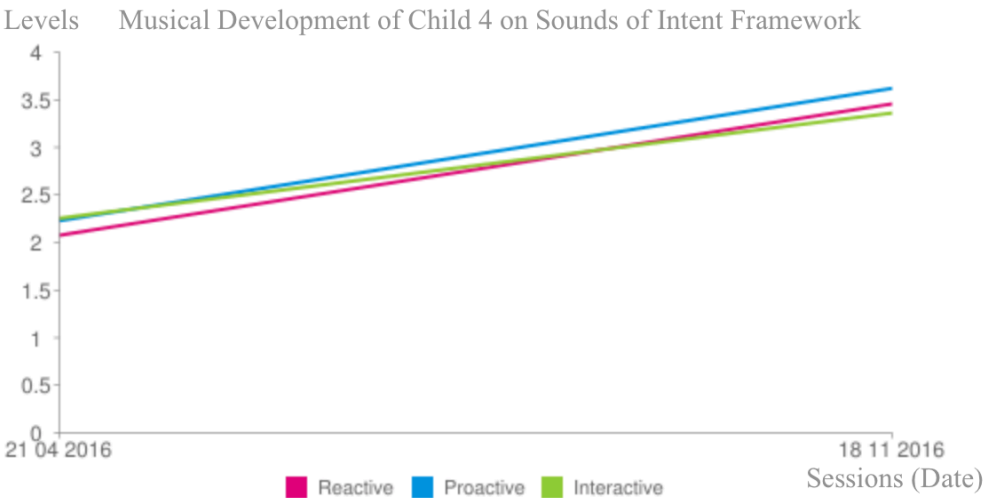


Figure 26. Progress of musical development of Child 4 over the course of sessions

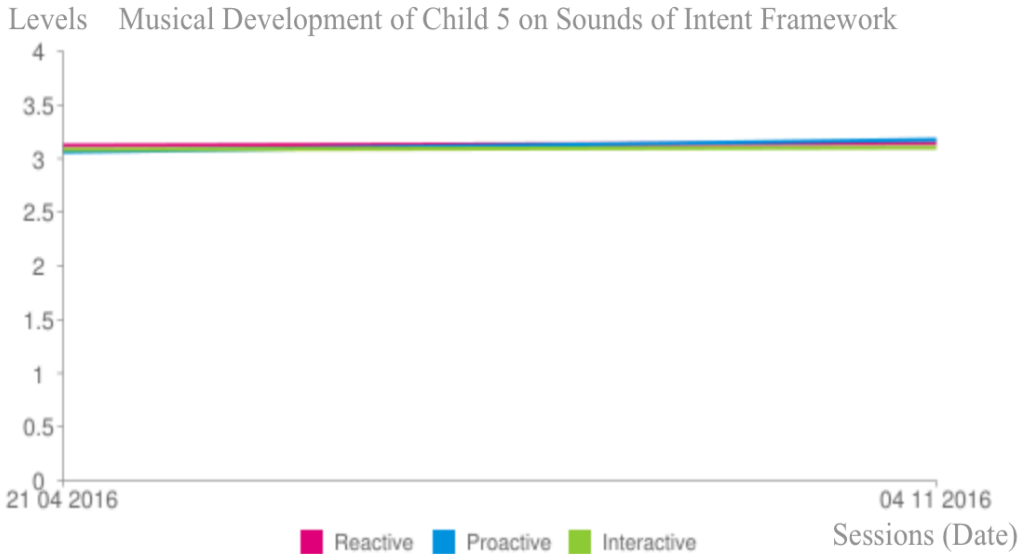


Figure 27. Progress of musical development of Child 5 over the course of sessions

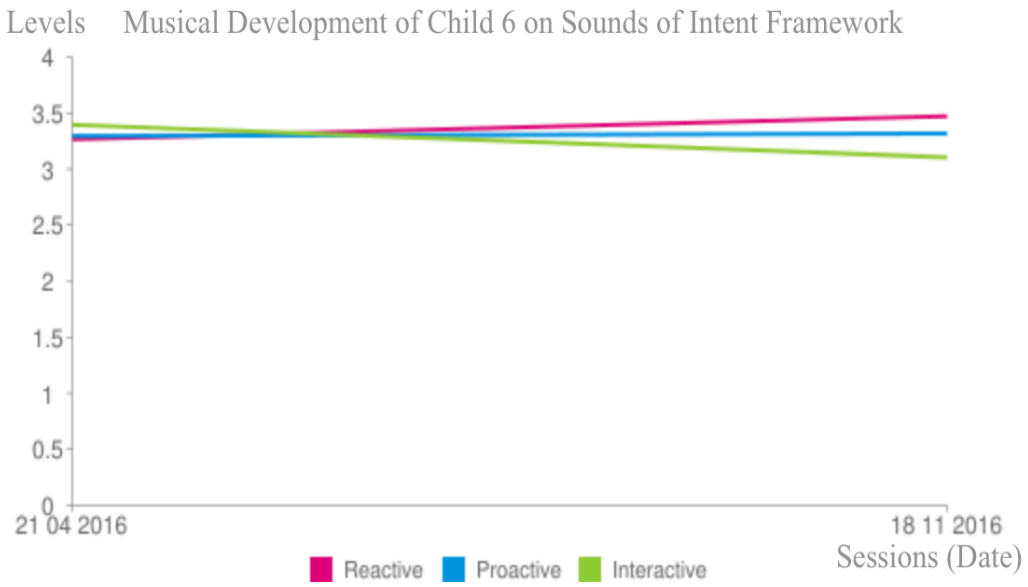


Figure 28. Progress of musical development of Child 6 over the course of sessions

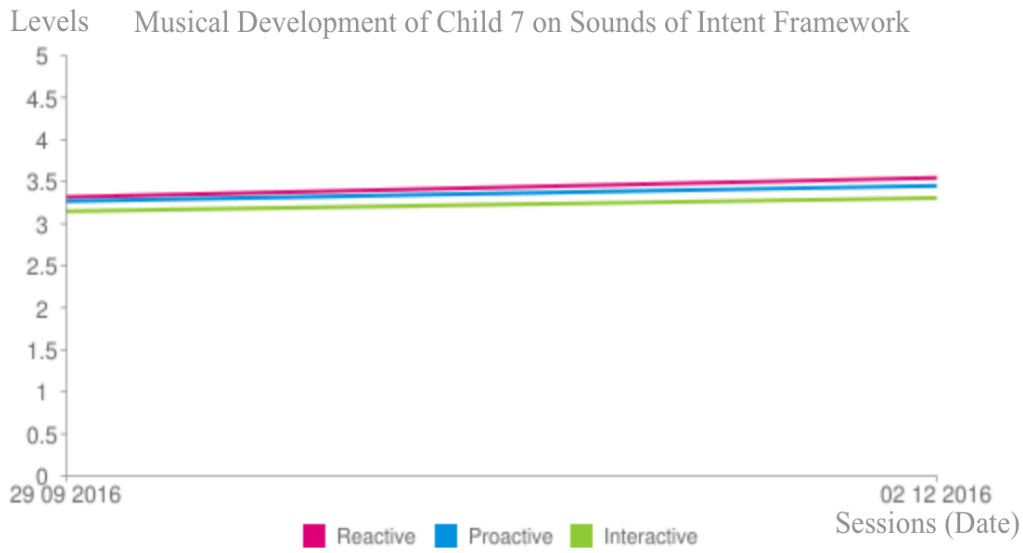


Figure 29. Progress of musical development of Child 7 over the course of sessions

Over the course of the sessions, the musical development of the children varied. Child 4 and Child 7 display a noticeable upwards trend in all three domains, which suggests that the strategy implementation was effective. This finding strengthens Vygotsky's theory of scaffolding. If a teacher offers appropriate support in the initial stage of learning, the student can learn to create and replicate the materials thereafter. For Child

5, the proactive and interactive domains witnessed a slight increase, which reflects a positive response to the strategy.

Compared to Children 4 and 7, Child 5 may need more time to react to the strategies or learn the instrument. Therefore, Child 5 registered only a slight increase in musical development. Meanwhile, the downwards trend in the reactive domain may indicate ineffectiveness of the strategy. Several possible explanations can account for such trend. For instance, the child might not have been listening conventionally and was instead internalising the sound while playing with other objects. He was also distracted by external stimuli i.e. the controllers on the digital piano and was attracted to other objects instead of listening attentively to the patterns I played. His behavioural challenges might also include difficulty sitting still and listening attentively. A slight downwards trend was also apparent in the interactive domain of Child 6. This trend was mainly due to the child experiencing distress during the last few sessions, which caused him to refuse interaction with me and prevented the sessions from running smoothly. Nevertheless, he was able to sit and listen to sounds or songs that I played on the piano. Perhaps the child started to lose interest in learning to play the instrument, or other unknown external factors could have contributed to his discomfort during the lessons.

5.5 Discussion

One reactive strategy, seven proactive strategies and two interactive strategies were developed and tested on participants. This section discusses the findings below.

5.5.1 Reactive

Children at Level 3 start to recognise simple patterns in sound. This development corresponds with Trehub's (2010) research on children's early cognition of musical

sounds and structures, which reported that infants have the capability of structural processing in pitch and perceived time. Systematic research evidences that a rich musical environment may positively influence a child's growing nature and level of evolving abilities (Hannon & Trainor, 2007; Tafuri, 2008). In this context, repeated experiences allowed a child's skill to develop alongside appropriate scaffolding from an adult. I again used the design of the piano (i.e. the repetition of the seven keys) to teach children to recognise simple patterns. In strategy R.3.A.1, I combined visual and auditory modality to help the children recognise patterns in sound.

The results of the strategy implementation reveal an upwards trend in engagement for only Child 7. Other children fluctuated in their engagement throughout the sessions and yielded no clear trends. Disengagement was analysed on the basis of cognitive autism theories to explain the scenarios. Children with ASC experience difficulty with sensory integration, which poses a challenge in linking incoming data from different sensory modalities. All four children exhibited this tendency, as they became distracted by the surrounding environment.

Child 5 in particular was obsessed with pressing the digital piano buttons and calling out the numbers on the metronome display, which led him to disengage from most of the sessions. Another speculation is that children with ASC use the preconscious system to take in information and use their senses peripherally (Bogdashina, 2016), so the children may not have been listening in an obvious way as I created sounds on the piano, and this behaviour would manifest as apparent disengagement from the task. The children's interest in the piano and the patterns I played might also affect their engagement, as evident from Child 6, who stopped me from playing to request songs.

According to Mayes et al. (2012), children with ASC are able to concentrate on

specific tasks for a long period of time if they are interested in the task. Overall, the strategy was effective in assisting the children to recognise simple patterns on the piano, as all four children met the success criteria of the piano curricular framework after the sessions and ultimately recognised patterns and structures in sound. They demonstrated such understandings through their engagement in creating simple patterns as well as their facial expressions when recurring patterns were played on the piano.

5.5.2 Proactive

The strategies that were developed address three elements. Element A teaches the child to create simple patterns on the piano. For this element, three strategies were developed. The first, P.3.A.1, used visual labels to clarify the geographical design of the piano for the children. I implemented this strategy with Child 5 and Child 6, as they were the only children with a basic comprehension of reading letters. The results indicate that the children's engagement fluctuated, and no trend was detected in the quantitative data. Two possible factors could explain the results:

1. The children were still developing their reading comprehension. For instance, Child 6 started playing the correct keys but named the wrong letters, from which I inferred that the child had not associated the letters with the keys.
2. The children became distracted by their surroundings. For example, Child 5 was distracted by the metronome display and constantly played on the piano buttons, which led to disengagement from the task.

As the children did not demonstrate high engagement with the strategy, I changed to another strategy to help them to create patterns on the piano. P.3.A.2 uses the kinaesthetic modality to assist children by holding their hands to play or using the

hand-under-hand technique. The results indicate that all four children had high engagement when the strategy was implemented, which suggests that it is effective for engaging and teaching children to produce simple patterns on the piano.

Since some children with ASC exhibit tactile defensiveness, P.3.A.3 was created to accommodate the kinaesthetic modality through the use of visual prompts and cues, such as by pointing to the correct keys. The engagement of all children fluctuated throughout the sessions, but they maintained a high percentage of engagement on average. One possible reason for disengagement during strategy implementation is the deficit in joint attention, which is a core impairment of children with ASC (Baron-Cohen et al., 1992; Charman et al., 1998) and may cause children to fail to respond to prompts. When teaching simple patterns on the piano, I noticed that the most effective strategy was to combine varied teaching strategies. It seemed that children with ASC who have severe learning difficulties benefited from multimodal (i.e. visual-auditory-kinaesthetic) learning. Overall, the strategies were effective for Children 4, 6 and 7, who were able to play simple patterns without physical prompting. Child 5 could create simple patterns only when I prompted him, which indicates that the child was still developing the skill of recognising simple patterns that can be produced on the piano.

For element B, one strategy that uses kinaesthetic modality was developed to teach simple patterns with a regular beat. Using kinaesthetic modality helps children feel the pulse through kinaesthetic listening (Keil, 1995), which contributes to their instinctive capacity for rhythm. The strategy was implemented only for Children 4, 6 and 7, as Child 5 was still in the initial stage of developing recognition and creating patterns on the piano. I implemented the strategy based on Terzi's notion of capability (2005) in accordance with the assessed abilities of each child. The results of the strategy reveal

high engagement of all three children, who could create simple patterns with a regular beat without my help after the sessions. These results suggest that the strategy is effective to teach regular beat to Level 3 children with ASC who have severe learning difficulties.

For element C, two strategies were developed. The first is based on kinaesthetic modality (P.3.C.1) and the other on visual modality (P.3.C.2). Strategy P.3.C.1 was implemented with Children 4, 6 and 7, but was again not applied with Child 5 since the skills build upon those from preceding levels (Ockelford, 2013). The results indicate high engagement among the three children, which implies effectiveness. However, Child 6 exhibited a decrease in engagement because he was unable to tolerate the input of me holding his hand. This obstacle prompted me to implement P.3.C.2, which is suitable for children with tactile defensiveness. The strategy uses visual prompts e.g. pointing on the keys to teach children simple patterns with regular changes. The results reveal a decrease in the engagement of Child 6; however, it does not signal that the strategy is ineffective, as Child 6 engaged in tantrums in the last couple of piano sessions. It was unknown why the child behaved in this way, but it is possible that he did not like the sessions or wanted to participate in other classes in school. Overall, the strategies were effective, as the three children were able to create simple patterns with regular changes without my support.

5.5.3 Interactive

The strategies that address the interactive domain involve three elements. For element A, the relationships between identical sounds in a series elicited responses from the child, which in turn led to interactive activity whereby the child imitated the sound I made. For element B, the child learned about the concept of imitation with my support. One strategy was developed to teach the child to imitate my playing, and I applied it

in combination with P.3.A.2 and P.3.A.3 to scaffold the child to imitate the patterns.

The results indicate fluctuating engagement throughout the sessions among Children 4, 6 and 7 as well as an increase in engagement for Child 5. Although the varying engagement did not yield conclusive results, the strategy proves effective for teaching children to copy musical patterns. At the end of the sessions, all of the children were able to imitate my patterns without support.

For element C, the strategy entails providing appropriate responses e.g. imitating the child's playing and encouraging the children's awareness of the imitation of their sounds in order to promote the concept of imitation. The results reveal no engagement among Child 4, 5 and 6 when I implemented this strategy. The engagement of Child 7 increased only over the first three sessions, which may indicate that the strategy was not effective for imitation recognition or that the children had yet developed consciousness of their own patterns being imitated. Imitation is a complex process which involves cognitive representation and visual-perceptual motor processing (Vanvuchelen et al., 2007), and the children might need additional sessions to such awareness.

Overall, the results imply that the strategies were effective in promoting musical skills among children with ASC who have severe learning difficulties, as evidenced by the progress of their musical development, which was mapped according to the SoI framework. The hypothesis was that effective strategies promote an increase in children's musical development. The findings illustrate an increase in musical development across all three domains for Children 4 and 7, while Child 6 advanced in the reactive and proactive domains but decreased in the interactive domain. Finally, Child 5 increased in the reactive and proactive domains but the remained unchanged

in the interactive domain. The rate at which children develop musically among the three domains is dependent on their functioning level, musical ability and interest in participation. Child 6 exhibited distress in the last couple of sessions and was reluctant to engage in interactive strategies; therefore, he improved in only two domains. Child 5 had only recently started to recognise and create simple patterns on the piano, so he had not yet developed the concept of imitation.

5.5.4 Summary of Musical Profile of Children 4, 5, 6 and 7

As Table 45 conveys, all participants met the success criteria in the piano framework and independently created simple patterns, with the exception of Child 5. Although Child 5 did not create patterns without my support, he was able to engage in the task and create patterns with appropriate support and prompting from me.

The fulfilment of success criteria suggests that the strategies were effective; nonetheless, the rate of learning is dependent on each child's ability. Child 5 needed more time to independently create patterns on the piano compared to the other participants.

Table 45. Summary of engagement of all children

Level 3										
Domains	Reactive	Proactive						Interactive		
Strategies (Modalities)	R.3.A.1 (A)	P.3.A.1 (V)	P.3.A.2 (K.A)	P.3.A.3 (V.A)	P.3.B.1 (K.A.)	P.3.C.1 (K.A)	P.3.C.2 (V.A)	I.3.B.1 (V.A)	I.3.C.1 (V.A)	Combination of Strategies
Child 4	●	-	●	●	●	●	-	●	●	Y
Success	Y	Y			Y	Y		Y	N	
Child 5	●	●	●	●	-	-	-	●	●	Y
Success	Y	N			N	N		N	N	
Child 6	●	●	●	●	●	●	●	●	●	Y
Success	Y	Y			Y	Y		Y	N	
Child 7	●	-	●	●	●	●	-	●	●	Y
Success	Y	N			Y	Y		Y	Y	

Notes: A=Auditory modality, K=Kinaesthetic modality, V= Visual modality, Y=Yes (use of combination of strategies, N=No (no combination of strategies), ● Engagement 70-100%, ● Engagement 40-69%, ● Engagement 0-39%, box with (-) =did not use the strategy, Y = met success criteria on the piano framework and N=did not meet the success criteria

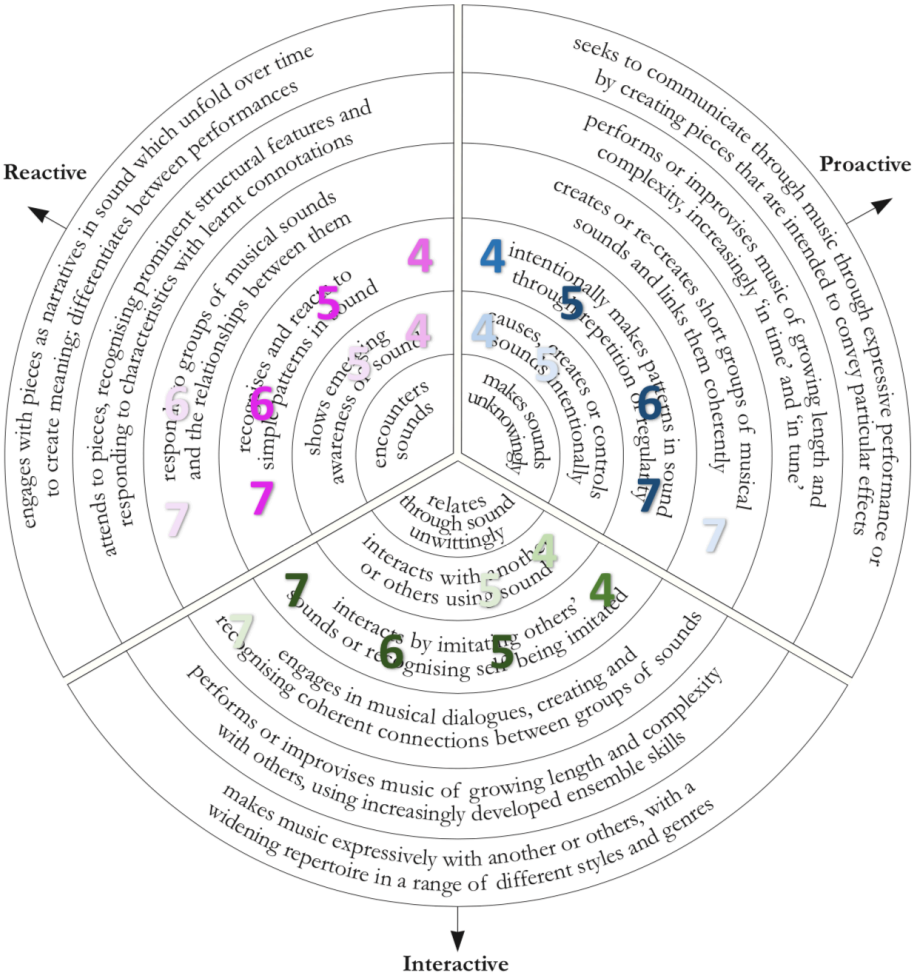


Figure 30. Concentric profile of Child 4, 5, 6 and 7

Figure 30 illustrates progress in all children's musical development over the course of the sessions. At the start of the sessions, Children 4 and 5 displayed musical behaviours at Level 2, however, after several sessions, they moved rapidly to Level 3, where they exhibited more complex musical behaviours. Children 6 and 7 presented slightly advanced musical behaviours that indicate their advancement towards Level 4 in their musical development. Overall, the concentric profiles demonstrate an outwards-moving tendency among all children, which suggests a progression in their musical development. A stack profile is also provided in Table 46 which shows the percentage of the occurrence of the musical behaviour.

Profile of Child 4					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	34	P2	30	I2	38
R3	66	P3	70	I3	62
R4	0	P4	0	I4	0
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 5					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	10	P2	5	I2	7
R3	90	P3	95	I3	93
R4	0	P4	0	I4	0
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 6					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	96	P3	100	I3	100
R4	4	P4	0	I4	0
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 7					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	92	P3	94	I3	79
R4	8	P4	6	I4	21
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Table 46. Stack profile of Child 4, 5, 6 and 7 over the course of the sessions

5.6 Conclusion

Chapter 5 has presented a detailed analysis of the children's engagement in each strategy. The results reveal that the strategies were generally effective in teaching Level 3 children to recognise and create simple patterns on the piano, which promoted musical skills.

The findings also encourage the use of visual labels i.e. labelling piano keys that the children can understand. The most effective strategies are child-centred and tailor resources to each child's learning style, ability and interest. Therefore, the strategies were combined to teach the children.

Chapter 6. Level 4 Results

6.1 Introduction

This chapter discusses the outcome of strategies that were examined with SoI Level 4 participants. Its layout follows that of Chapter 4, and the methodology is detailed in Chapter 3.

6.2 Background of Participants

6.2.1 Child 8

Child 8 is a Black African female with ASD who was eight years old when the research was conducted. According to her class teacher, she can be strong-headed and highly reluctant to engage in a task if she does not wish to; therefore, she often needs one-to-one support to complete an activity. She communicates with body language and facial expressions and sometimes uses words and phrases such as 'no', 'go away' and 'yeah'. She has some echolalia, whereby she repeats words or phrases after she has heard them. She is currently working on PECS to improve her communication. She enjoys interacting with others but finds it difficult to take turns in an activity and always wants to take the first turn. She can also be disruptive and non-compliant when one does not fulfil her wishes. The following excerpt is a musical description from her music teacher:

> Child 8 likes to sing, and she participates in the choir. She is able to pick up tune very quickly and is able to sing in time. However, she has short attention span and will lose concentration sometimes during the lesson. You will need to call for her to get her attention back. She has difficulty when it comes to turn-taking activity and always want to be first and could not wait patiently. You will have to be firm to her so that she complies to your instructions so that it is not disruptive to the

class.

6.2.2 Child 9

Child 9 is a Polish male who was 15 years old at the time of the project. He was diagnosed with ASD with moderate learning difficulties and uses a limited set of words to communicate. His music teacher provided the following description:

> Child 9 is involved in voice workshop. He is proactive and interactive in music. He is very sociable and playful during music lessons. He will pick up a guitar and start playing sometimes. He likes to sing and is able to sing short extracts. He is particularly drawn towards songs from the sixties.

6.2.3 Child 10

Child 10 is an Indian male who was 15 years old when the research was carried out. He was diagnosed with ASD and severe learning difficulties with behavioural issues. He communicates with limited words and only initiates conversations that interest him. He has a brief attention span and can focus on a task for only five minutes. The music teacher described him as follows:

> He is outgoing, and he loves singing. He likes to join in singing in a group and sometimes will be able to sing solos of short phrases. If you catch him on a good day, he is able to sing a very high pitch. He has a very low level of concentration at the moment.

6.2.4 Child 11

Child 11 is a Somalian male who was 10 years old when he participated in this project. He was diagnosed with ASD and ADHD with significant visual impairment. He can communicate verbally and is able to engage in a task if he wants to; however, he

occasionally tries to run away. He is obsessive and repeatedly talks about or questions certain matters. The following short description is from his music teacher:

> Child 11 is happy to participate in his music lessons. He likes to explore different instruments and likes to explore different musical dynamics, such as loud and quiet. He is capable of playing the instrument rhythmically. He will respond through repetitions but not consistently. He will get distressed by loud sound, such as using the microphone, sometimes.

6.3 Strategies in Level 4 SoI Framework

In accordance with the SoI framework, the Level 4 strategies cover three domains: reactive, proactive and interactive. Here, I assume that despite their lack of prior piano training or piano basics, children at Level 4 are still able to engage in the task and learn to create musical motifs. On Level 4, this project tested one reactive strategy, two proactive strategies and six interactive strategies. Technique development was not a focus; rather, I concentrated on the aim of creating music. The children might struggle to consciously reflect on their actions and lack a receptive vocabulary, which hinders them from understanding technical issues. Only once such children achieve musical aims can their teacher proceed to correcting the technique. Balance is crucial; using the entire session for learning techniques denies the child the principal source of pleasure and achievement. This assertion is in line with Terzi's notion of capability.

6.3.1 Reactive: Element A

In Level 4, children evolve their perception of sounds. They perceive sounds to be functioning as a group as well as the possible relationships between sounds. These developments concur with the literature on children's early cognition of musical

sounds and structures. Trehub (2010) provided an overview of research in this area that has been published since the 1970s, wherein he noted infants' capability of structural processing in the domains of pitch and perceived time. With these abilities, a young child can then perceive patterns and mentally group sounds in relation to both melody and rhythm.

I worked under the assumption that one can learn to create motifs on the piano with no prior piano training and piano basics, and I could employ the piano to demonstrate the production of such motifs to children. I provided broad listening materials before teaching the child to proactively produce the motifs. To select appropriate motifs, I obtained information from the music teacher and class teacher of each child with respect to the music and songs to which the child had been listening. Using familiar songs or pieces can motivate children to engage in a musical activity (Schott, 2016) which is completely new to them. Children with ASC have a fondness for repetition in music listening (Turner, 1999). As far as I was able to ascertain, this project was the first time that the children had the opportunity to systematically explore the piano.

Strategy 1 (R.4.A.1)

The teacher demonstrates playing a set of motifs on the piano and pauses between each one to allow the child to listen.

In this context, children engage by listening. Children with ASC appear to ignore stimuli because of sensory integration challenges; therefore, I acknowledge that the children might listened unconventionally. However, children who function on this level exhibit higher concentration levels compared to children at Levels 2 and 3.

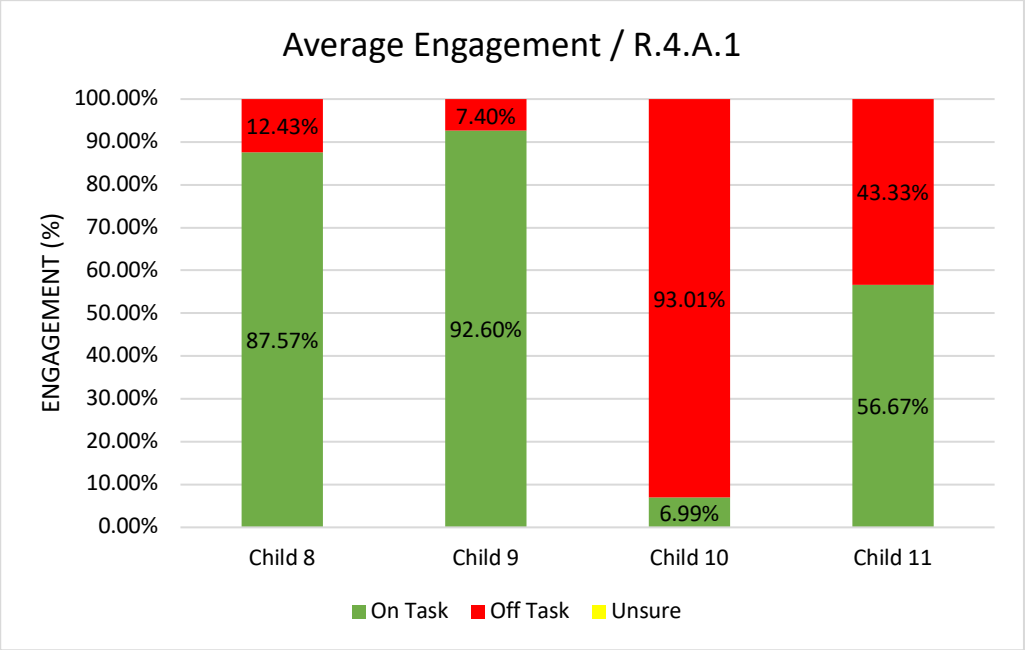


Figure 31. Average engagement of Child 8, Child 9, Child 10 and Child 11

Figure 31 reveals that the engagement of the children varied. In addition, Children 8 and 9 demonstrated higher engagement than Children 10 and 11. The following scenarios may explain this phenomenon:

Table 47. Scenario 1

Researcher's action:	I implemented R.4.A.1 and played various short motifs for the child. I chose the motifs from nursery songs or songs to which the child had been listening in class and music lessons.
Child's reaction:	All children attended to the motifs, albeit inconsistently.
Analysis:	At times, the children did not attend to the motifs that I played, which could be attributed to several explanations. According to Ockelford (2013), attending purposefully to music requires a range of perceptual and cognitive processes that normally operate subconsciously. The ability to identify trends and patterns among stimuli (Level R3) and assign them to groups (Level R4) and hierarchies (Level R5) is associated with the

	development of perception in other domains. When children were not able to attend to the motifs that I played, they may have not yet developed the ability to identify the motifs and therefore distanced themselves as I played. General cognitive attributes, such as concentration and memory, may also contribute to children's engagement in a task; all children reflected this possibility, as they occasionally lost concentration and started to look around the room before returning to the performance.
Researcher's thought process and action:	According to an extensive study by Bunt (1994) on the effects of music therapy for children with learning difficulties, the exposure of appropriate musical activities could help children focus their attention and increase their concentration span. He observed that, over time, music therapy can enhance a child's ability to sustain and initiate activities. However, many repetitions and sessions are necessary to extend the child's concentration. This effect is apparent in Child 11's results, which reflect an upwards trend over the first four sessions. In this case, I would continue with the strategy by exposing the child to a variety of motifs.

Table 48. Scenario 2

Researcher's action:	I implemented R.4.A.1 and played several short motifs for the child. I chose the motifs from nursery songs or songs to which the child had been listening in class and music lessons.
Child's reaction:	Children experienced distress and verbally expressed disengagement from the task.

Analysis:	Studies reported that some children with ASC and learning difficulties experience behavioural challenges that can include tantrums, physical aggression and self-harm (McClintock, Hall & Oliver, 2003; Shattuck et al., 2007). These behaviours often have a catalyst, and research indicated that they often involve a communicative intent (Iovannone, Dunlap, Huber & Kincaid, 2003). In this scenario, Child 8 (session 11), Child 10 (all sessions) and Child 11 displayed behaviours such as crying and screaming and were reluctant to engage in the task. Possible explanations for each child's behaviour are as follows: In session 11, Child 8 was already feeling distressed when she arrived at the lesson. She was crying and reluctant to attend the session because she was playing on a computer in her classroom. Throughout the session, she shouted 'No! No!' and cried. This behaviour could indicate a problem with transitioning between tasks, as she was playing on the computer and expressed reluctance to move on to her piano lesson. Child 10 presented an interesting case as the only one who verbally communicated throughout all sessions that he did not want to play the piano. Even though I played songs that he liked, he shouted 'No! No!' and pulled my hand away from the piano. The teaching assistant was always in the class to help in case the child became extremely distressed. She mentioned that Child 10 has a short concentration span, so allowing him a break might help. I then changed the lesson structure to one minute of piano followed by a one-minute break; however, this did not work, and he was still reluctant to participate. The child possibly

	disliked the piano, may experience sensory integration issues or might have been hypersensitive to the sound of the piano. However, I did not immediately discharge him from the project, as I recognised that the environment and instrument were new for the child. The child might have needed some time to feel comfortable around me and the instrument. Therefore, I decided to carry on with the project. In session 8, Child 11 was far more engaged in playing the piano than in listening to the music. He constantly interrupted my playing by pressing random keys on the piano. It seemed that the child was eager to explore the piano or had difficulty with sensory integration, thus struggling to make sense of the incoming stimuli. To contend oversensitivity, the child blocked my playing by playing random keys on the piano.
Researcher's thought process and action:	Many possibilities may have contributed to the children in these cases being distressed and disengaged from their task. Therefore, I intend to observe and provide appropriate responses and modify the strategies or lesson to tailor to each child's need. In scenarios like this, I stopped the lesson to prevent the child from feeling distressed further. For Child 11, I then changed the strategy to proactive and interactive strategies.

Table 49. Scenario 3

Researcher's action:	I implemented R.4.A.1 and played multiple short motifs for the child. I chose the motifs from nursery songs or songs to which the child had been listening in their class and music lessons.

Child's reaction:	The child interrupted me by playing random keys on the piano.
Analysis:	This scenario occurred with Child 11, who constantly disrupted my playing. This behaviour might be due to difficulty with sensory integration, wherein a child faces challenges with linking incoming data from different sensory modalities. Notably, Child 11 was faced with an environment, instrument and teacher that were all new to him. In addition, my playing of the instrument might have caused sensory oversensitivity that triggered the child to play random keys on the piano to block out the sound. Another possible explanation is that the child wanted to explore the new instrument.
Researcher's thought process and action:	Since the child's constant disruptions made it impossible to play for him, I used the strategy of instructing the child to take turns and only allowing him to play when I called his name. This strategy worked well; the child stopped playing when he heard 'It's Sam's turn' and then waited for his turn to play. This strategy seems effective, as his engagement increased.

These strategies were effective to provide a broad listening experience of musical motifs for the children. Constant exposure to a range of motifs familiarised the children with them, which, as the strategies below demonstrate, supports creating them on the piano.

6.3.2 Proactive: Element A

Rogoff (1990), Vygotsky (1978) and Wenger (1998) characterised learning as a constructive process of the individual that takes place in a social context. This idea is key to music learning and teaching, which implies that music educators should be

aware that the knowledge is grounded in first-person experience, and consciousness of the self and body is important in the learning relationship (Bowman, 2004).

The implications of the ToM postulate that children with ASC have a diminished understanding of others' minds (Baron-Cohen, 2002). The theory further discusses that individuals with ASC have similar difficulty with recognising mental states of the self (Frith, 2013). Because of this, these may not possess a consciousness of how the self and body are involved in the process of learning. To address this gap, this study implemented scaffolding. Vygotsky's ZPD stresses the importance of the environment for learning and development in the early years. The environment is first scaffolded by an adult before the child proceeds with creating and replicating the materials alone (Wood et al., 1976). The vision of scaffolding in this project includes the teacher supporting the child's piano-learning experience by providing appropriate groundwork for producing musical motifs on the piano. Making music is the priority, and only once the child is familiar with the materials can a teacher introduce simple piano techniques.

Strategy 1 (P.4.A.1)

The teacher supports the child by holding his or her hand or using the hand-under-hand or hand-over-hand technique to play the musical motif on the piano.

This strategy uses the kinaesthetic modality to help children produce musical motifs on the piano.

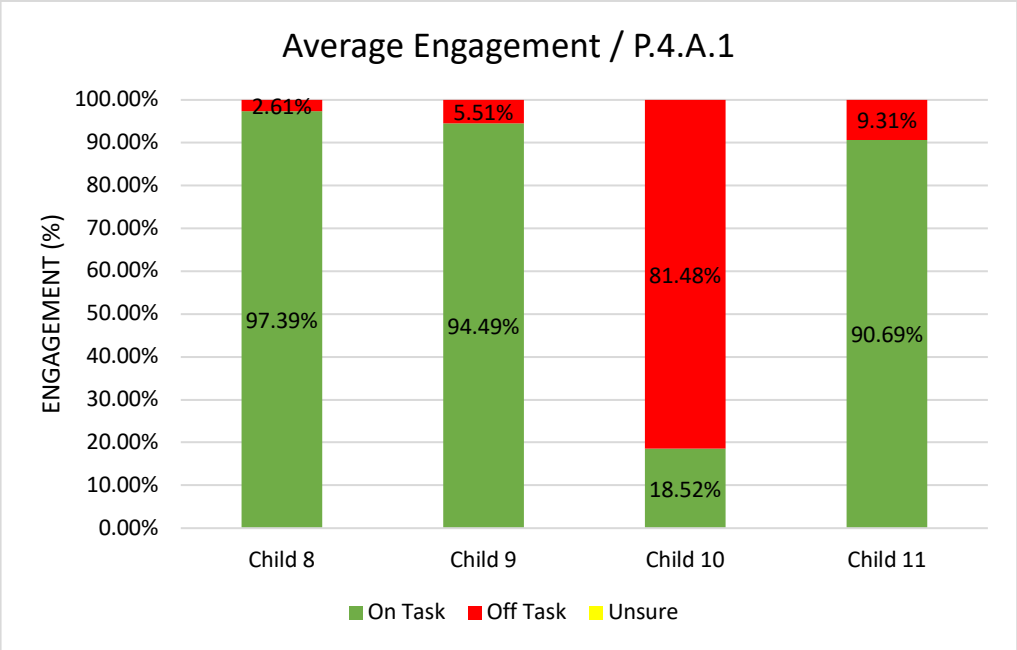


Figure 32. Average engagement of Child 8, Child 9, Child 10 and Child 11

As Figure 32 indicates, the percentage of engagement was high, thus suggesting that the strategy is effective, although the engagement of Child 9 fluctuated more than that of the others (see Appendix 15). The table below provides a possible explanation.

As in the implementation of R.4.A.1, Child 10 was reluctant to engage in any piano activity during the sessions, throughout which he was constantly distressed and verbally expressed 'No!' I had to excuse him from the project, as he was unable to engage in any activities even though I tried several approaches.

Table 50. Scenario 1

Researcher's action:	I implemented P.4.A.1 and held the children's hand to learn to play familiar and repetitive motifs to which they had listened in the session.
Child's reaction:	The child tolerated the input and engaged by playing motifs with my help. After the session, the child was able to play motifs without my support.

Analysis:	Besides Child 10, all the children seemed able to tolerate me holding their hand for support in playing the motifs. This strategy was effective through a combination of visual and kinaesthetic modalities to aid in creating motifs. While the children might have been able to imitate the motifs, this strategy further reinforced their learning by supporting them in playing the accurate keys.
Researcher's thought process and action:	This strategy seems effective to teach children to create motifs on the piano. The next step is to engage the children in imitating the motif via call and response to teach the concept of cause and effect (see I.4.B.1).

Table 51. Scenario 2

Researcher's action:	I implemented P.4.A.1 and held the children's hand to learn to play a familiar and repetitive motif to which they had listened during the session.
Child's reaction:	The children disengaged halfway through the strategy and pulled their hand away from me. This occurred in all children but child 9 exhibited it the most.
Analysis:	General cognitive attributes, such as concentration and memory, may have contributed to the child's engagement in the task. This was apparent with all children, as they disengaged halfway through the strategy's implementation, possibly due to concentration loss. In addition, children with ASC often display inconsistent perception (Bogdashina, 2016). Therefore, they may respond differently to the same stimuli, such as in the present scenario,

	wherein the children disengaged, possibly because of sensory overload.
Researcher's thought process and action:	Since not all children were able to tolerate the sensation of touch, I modified the strategy so that the child could learn to play motifs without physical support (see strategy P.4.A.2).

Strategy 2 (P.4.A.2)

Since some children with ASC exhibit tactile defensiveness, teacher cannot employ strategy P.4.A.1 for them. This strategy requires the teacher to provide cues, such as pointing to or naming the keys, to direct the child to create motifs on the piano.

This strategy accommodates children with tactile sensitivity while still teaching them to create simple patterns. It can be used in combination with an interactive strategy i.e. I.4.B.1 and I.4.C.2 through which the child learns to imitate patterns. Not every child already understands the concept of imitation, but providing appropriate support, such as visual cues, can demonstrate the relationship between cause and effect.

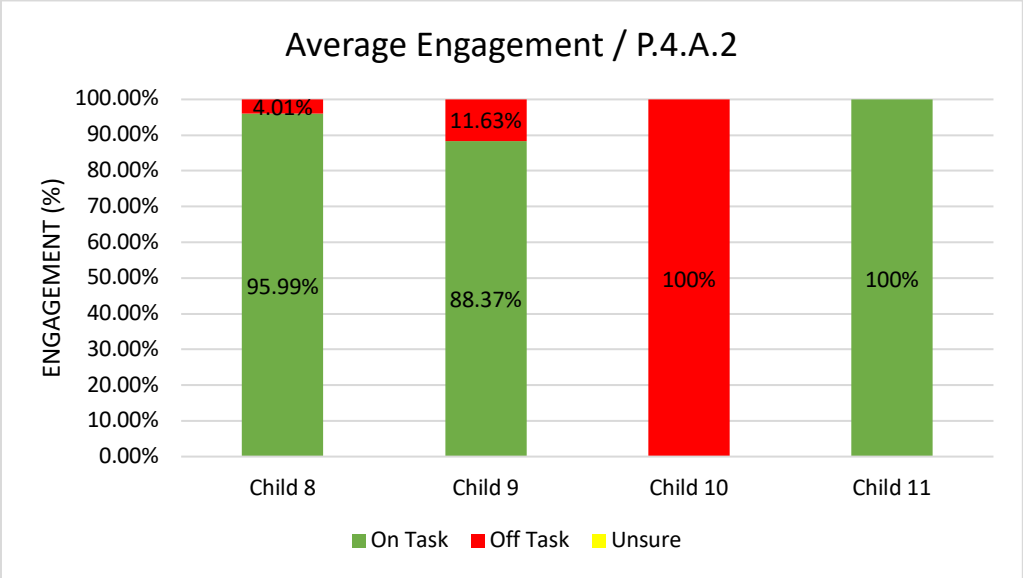


Figure 33. Average engagement of Child 8, Child 9, Child 10 and Child 11

Figure 33 reveals a high percentage of engagement in the task, which suggests that the strategy is effective, especially for Child 11, who consistently engaged in the task. I

only implemented the strategy in sessions 7 and 8, as Child 11 responded better to P.4.A.1 and preferred an interactive strategy (see I.4.C.2) to learn the motif.

Table 52. Scenario 1

Researcher's action:	I implemented P.4.A.2 by providing prompts, such as pointing to or naming the key.
Child's reaction:	Children 8 and 9 disengaged from the task halfway through and were unable to play the motif when prompted.
Analysis:	A deficit in joint attention, which is necessary to respond to a cue or prompt, is a core impairment for children with ASC (Baron-Cohen et al., 1992; Charman et al., 1998). A child with such impairment may fail to respond to joint attention. In this case, both children failed to respond to the cues on the keys. This task also required visual processing i.e. looking at the cues and auditory and information processing i.e. singing the lyrics. Studies reported that children with ASC exhibit a delay in processing (Hume et al., 2009; Bogdashina, 2016), which may cause disengagement from a task.
Researcher's thought process and action:	With this analysis in mind, I switched strategies so that the child was comfortable with continuing the task. I used this strategy in conjunction with I.4.A.1, which helps the child accurately imitate the motif.

Table 53. Scenario 2

Researcher's action:	I implemented P.4.A.2 by singing short motifs to the child.
Child's reaction:	The child engaged through listening and then playing the motif.

Analysis:	I applied this strategy only with Child 8, who I recognised to have absolute pitch, as she was able to figure out the motif on the piano once she had heard me play or sing it. She always played the pitch accurately, and she realised when she played the wrong key, after which she would explore the pitches on the piano until she found the correct pitch. This phenomenon is not unusual among children with ASC, and Ockelford (2013) reported that children with ASC are approximately 500 times more likely to develop 'absolute' perceptual skills compared to those in the general Western population. According to Miyazaki (2004), pitch labelling is not an essential element of absolute pitch, so it does not exclude children with ASC who possess little to no language and thus no immediate way to demonstrate their special skill. I discovered that Child 8 had absolute pitch when she started playing the short motif immediately after me without support. She recognised a wrong note and independently explored the pitches until she found the correct note. In another session, I sang a short motif to her, and she started to play the motif, but her pitches were flat. I had sung the motif flat without realising until the child played it on the piano, which reaffirms my conclusion that Child 8 has absolute pitch.
Researcher's thought process and action:	Children with absolute pitch benefit from learning through imitation or 'rote learning', which not only enhances the memory but also improves joint attention skills, as the child is able to hear the music internally and produce it accordingly. With appropriate scaffolding, the child can progress to

	functioning at SoI Level 5, wherein children learn to play simple pieces.

In summary, both of the proactive strategies were effective to assist the children with learning musical motifs on the piano. Every child warranted a different learning style; therefore, I was open-minded about combining strategies to maximise each child's learning.

6.3.3 Interactive: Element A

Research indicates that children with ASC have difficulties in imitation which may continue into adulthood (Charman et al., 1998; Stone, Ousley & Littleford, 1997). In addition, poor imitation skills may be associated with the core social communication, affective and cognitive impairments of ASC (Leary & Hill, 1996; Meltzoff, Gopnik, Baron-Cohen, Tager-Flusberg & Cohen, 1993; Srinivasan et al., 2015). Evidence also reflects that individuals with ASC exhibit impairments in gross and fine motor performance and interpersonal synchrony at a very early age (Marsh et al., 2013; Landa & Garrett-Mayer, 2006).

Children who suffer from impairment in gross motor performance have significantly poor postural control (Minshew, Sung, Jones & Furman, 2004; Srinivasan et al., 2015), gait patterns (Hallet et al., 1993) and bilateral coordination skills, which may contribute to difficulty with imitation (Vivanti, Trembath & Dissanayake, 2013). However, in case studies of children who worked with Ockelford (2008; 2013), most children at Level 4 or above learned instruments through imitation, while children at Level 3 began to develop this skill. Individuals on this level are able to engage in musical dialogue through coherent clusters of sounds and imitating clusters as a whole. They can also recognise and respond to these, thus generating call and response.

In this domain, the piano was used for joint attention activities, such as call and response. I made the assumption that children produce musical motifs with the expectation of stimulating a coherent response; thus, by providing an appropriate response, a teacher can further their joint attention skills and reinforce the cause-effect relationship.

Strategy 1 (I.4.A.1)

The child plays a set of musical motifs. The teacher makes an assumption that the child expects a response from the teacher. The teacher imitates the motif or completes the remainder of the piece.

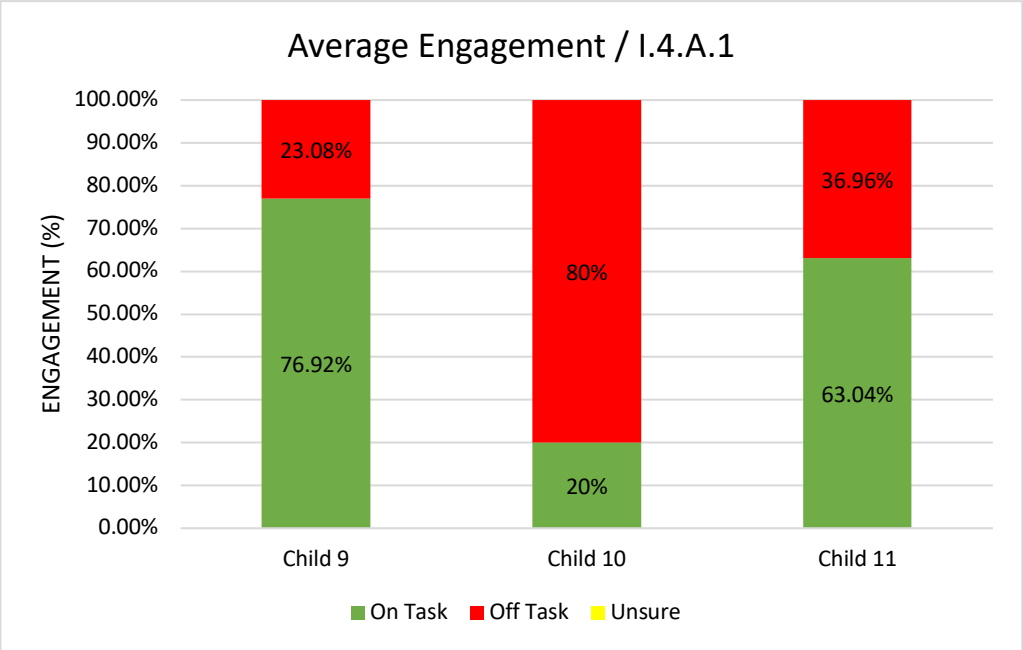


Figure 34. Average engagement of Child 9, Child 10 and Child 11

Figure 34 indicates that I implemented the strategy only with Children 9, 10 and 11. Child 8 had never initiated a motif and waited for a response; she liked to imitate my playing instead of the reverse. Therefore, I did not implement this strategy with Child 8.

Table 54. Scenario 1

Child's action:	Child 8 never initiated a motif for me to imitate.
Analysis:	Core impairments of children with ASC are deficits in social communication and social interaction (APA, 2013). Children with ASC often struggle with or are uncertain how to initiate an interaction. One reason may be communication challenges due to delayed development of receptive and expressive language. Child 8 had yet to initiate an activity. An unawareness that their own sound was being imitated can be explained through the ToM, which postulates that individuals with autism have difficulty with inferring the mental states of others (Baron-Cohen, 2008). However, Lang and Perner (2002) further explained that children with ASC have a diminished awareness of their own intentions. Child 8 was mainly guided by me in all of the piano activities. Even though she did not initiate interaction, she liked to imitate my playing and took turns with me. Her case illustrates that with proper scaffolding, children may learn interaction and improve their joint attention. Moreover, it can require many repetitions for them to fully understand the concepts of imitation or cause and effect.
Researcher's thought process and action:	For future reference, to help the child understand the concept of imitation, I can continue with the interactive strategy (I.4.B.1) and provide cues to prompt the child to initiate playing a motif for the researcher to copy.

Table 55. Scenario 2

Researcher's action:	I waited for the child to play a short motif and implemented

	I.4.A.1 to imitate the motif in return and observed the child's reaction.
Child's reaction:	The child was unaware that his own sound was being imitated.
Analysis:	This unawareness that one's own sound is being imitated can be explained through the ToM, which postulates that individuals with autism have difficulty with inferring the mental states of others (Baron-Cohen, 2008). The ability to understand another person's action and imitate it if needed is a core component of human social behaviour. A core impairment of children with ASC is a deficit in social communication, which contributes to an unawareness of one's own sound being imitated. However, with repetition, this strategy improve their awareness skills, as represented by an upwards trend in the graph (see Appendix 15 and 17). Child 9's performance dropped in session 5, which can be explained by a loss in his concentration level.
Researcher's thought process and action:	Since deficits in social interaction and joint attention are core aspects of ASC, it was common for children to be unaware that I was imitating their own sound. Repetition can improve this skill; therefore, I continued to imitate the children's motifs whenever they paused.

In summary, through the repetition and my support in this strategy, children became aware that I was imitating their own sounds. The children started the session with no awareness of their own motifs being imitated, but through many repetitions, some of them recognised that I was imitating their musical motifs.

6.3.4 Interactive: Element B

For this element, I used the piano for 'call and response' music making. This strategy

is particularly useful for children with absolute pitch. According to Ockelford (2013), the sound in their head drives them to reproduce the sound on the piano; thus, the ear leads the hand. Therefore, the most suitable approach for them to learn an instrument is by ear, wherein they and the teacher engage in a play-and-copy dialogue. For children without absolute pitch, this strategy is useful for children who have comprehension difficulties with learning to play music by ear.

Strategy 1 (I.4.B.1)

The teacher plays motifs on the piano with several pauses for students to imitate in return. The child engages through listening and looking and imitates the motifs played by the teacher. This strategy enhances both attention and memory skills.

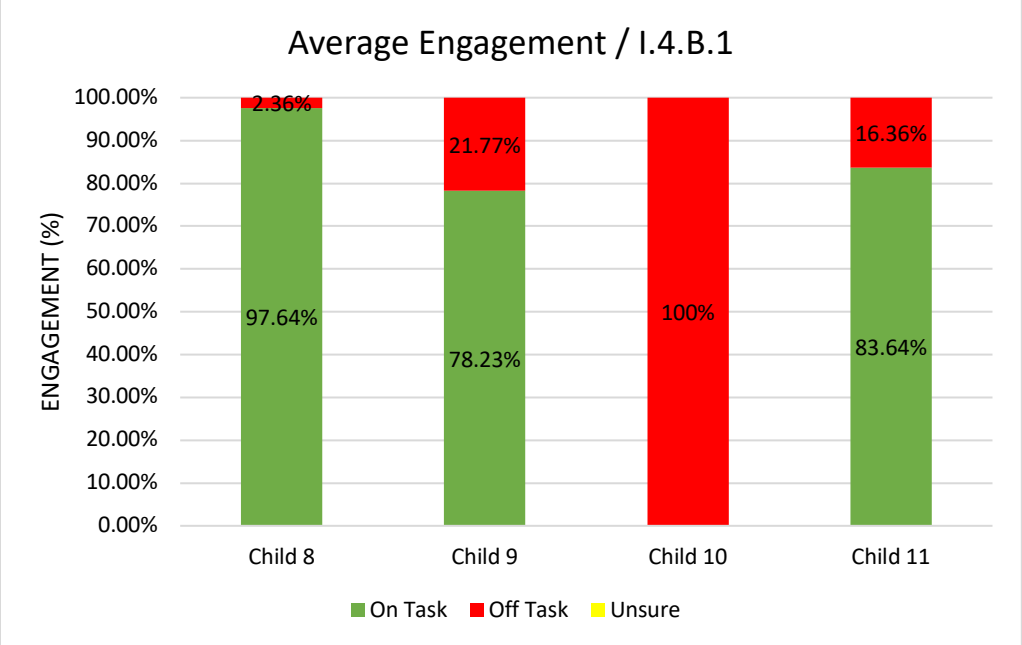


Figure 35. Average engagement of Child 8, Child 9, Child 10 and Child 11

Figure 35 illustrates that all children had a high percentage of engagement during this strategy implementation. The exception was Child 10, who refused to participate and experienced distressed throughout the session. While teaching musical motifs, I discovered that this is strategy was particularly effective for Child 8, who has absolute pitch. According to Ockelford (2013), such children only need to reproduce the groups

of notes that they hear and map them in relation to the given pitches on the piano. Once they have learned this skill, it supports a lifetime of music making. Thus, the best way to learn an instrument is by ear i.e. engage in a play-and-copy dialogue.

Table 56. Scenario 1

Researcher's action:	I implemented strategy I.4.B.1 by playing a short motif that the child had listened to or learned with strategy P.4.A.1/P.4.A.2 and paused for the child to imitate.
Child's reaction:	The child did not imitate accurately or disengaged from the task.
Analysis:	Children with ASC exhibit a deficit in joint attention. The ability to imitate relies on cognitive representation and visual-perceptual motor processing (Vanvuchelen et al., 2007; Schott, 2016), which are associated with the development of language, play and joint attention. Theories of cognitive development view imitation as a skill that facilitates understanding between the self and the environment and especially between the self and others (Hobson & Lee, 1999). Although children with ASC are able to imitate others, they do so less accurately and often than their typically developing peers (Rogers et al., 2003; Williams, Whiten & Singh, 2004; Schott, 2016). This tendency was apparent with Children 9 and 11, who do not have absolute pitch. Therefore, unlike Child 8, they found it more difficult to accurately imitate my playing. They heavily relied on visual processing and the ability to imitate, and failure in these regards this may have affected their engagement in the task.
Researcher's thought process and	It is through many repetitions that children grasp the concept of imitation. Not all children at Level 4 or above possess absolute

action:	pitch, so appropriate support is necessary to teach children imitation. For children who are still developing this concept, I can implement strategy I.4.B.2 by using cues, such as pointing to or naming the keys, to help them play the motif.

Strategy 2 (I.4.B.2)

I recognise that imitation skill requires the ability of representational and visual perceptual-motor processing; therefore, some of the children with ASC may find imitation difficult at first. By providing appropriate support, one can help to develop the skill. The teacher used visual cues such as pointing towards the keys to help the child in imitating the accurate keys. This strategy can be combined with P.4.A.1, wherein the teacher supports the child by holding their hand to imitate the materials.

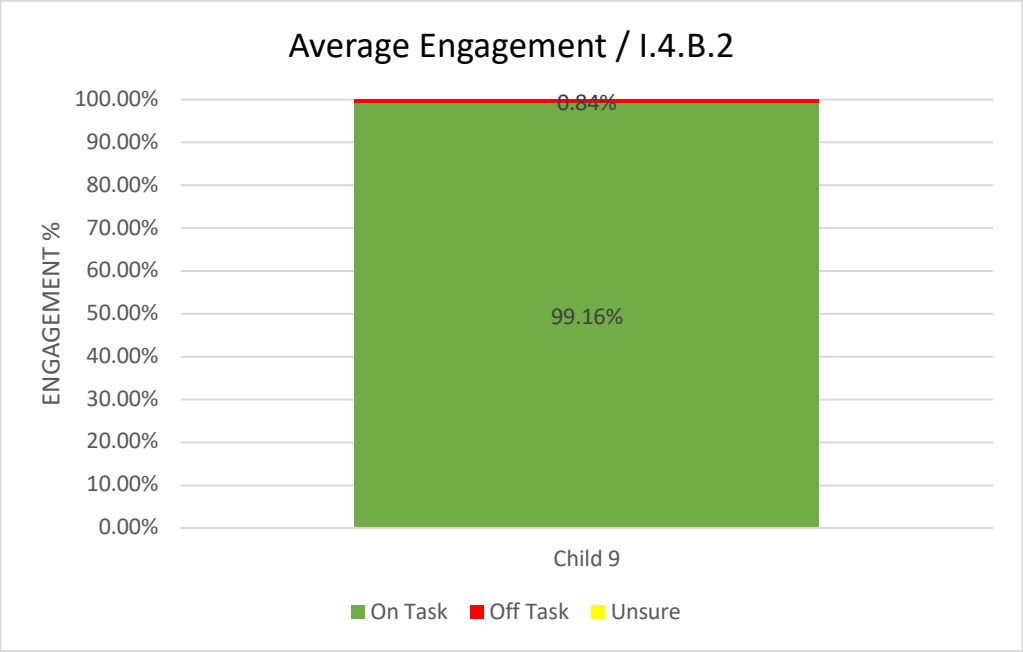


Figure 36. Average engagement of Child 9

Figure 36 shows that I only implemented this strategy with Child 9; Child 8 has absolute pitch and she was able to imitate me immediately after and accurately. Regarding Child 11, from Figure 33, one can see that he had high performance in imitating my playing and accurately throughout.

Table 57. Scenario 1

Researcher's action:	I implemented I.4.B.2 by playing a short motif and then pointing to the correct keys as a visual prompt to guide the child in accurately imitating the material.
Child's reaction:	The child engaged during the session but sometimes lost concentration and disengaged from the task.
Analysis:	General cognitive attributes, such as concentration and memory, may have influenced the child's engagement in the task. Child 9 lost concentration during session 10, after which he looked around the room and would not imitate my playing.
Researcher's thought process and action:	In this scenario, several approaches are possible. First, I could take a short break to allow the child to disengage from the task. With this strategy, a child with ASC and a short concentration span can clear his or her mind and return to the task when ready. Second, I could change the strategy, such as by playing the motifs several times for the child and only then returning to the imitation task. Third, I could modify the strategy to be more proactive in helping the child by holding his or her hand to play the motifs.

In summary, the strategies were effective in teaching the children to imitate the motifs on the piano; however, not all children immediately understand the concept of imitation. A sufficient duration and number of sessions should be allowed for children to grasp the concept of imitation. Through many repetitions, children become aware of the actions of imitating others and being imitated. Children also possess different learning modalities, so teachers should consider altering the strategy to suit each child's learning needs.

6.3.5 Interactive: Element C

Once a child developed imitation skills and engages in call and response activity, I could model interactions by linking motifs.

Strategy 1 (I.4.C.1)

The teacher deliberately plays incomplete motifs with pauses for the student to complete the remainder of the motif. This strategy can scaffold the child to imitate material. As imitation skills are new and require a high cognitive and processing level, the short-term memory of some children may prevent them from imitating the full motifs. In such a case, the teacher can help the child recognise the motif in parts. To this end, the teacher can deliberately play incomplete motifs so that the child can complete the remainder. Thereafter, the teacher can increase the length of the motifs until the child achieves an imitation of the full motif.

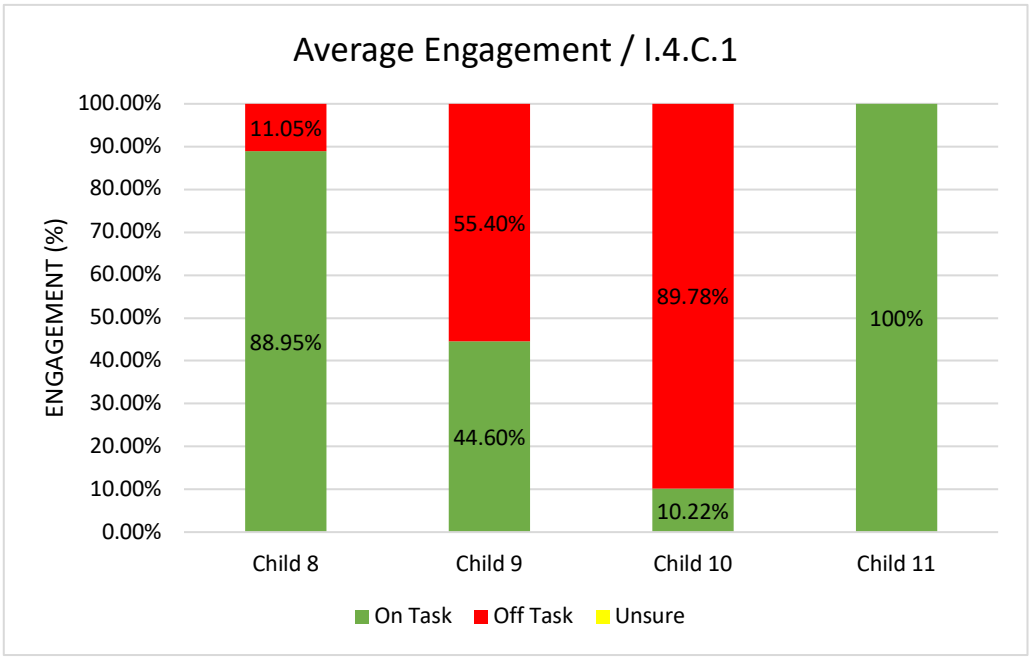


Figure 37. Average engagement of Child 8, Child 9, Child 10 and Child 11

There are several learning objectives in this strategy. One example is to help the child learn the motif by dividing it into parts. Second, it aims to enhance the child's memory. The strategy can test whether a child remembers or recognises a motif that he or she

has learned and completes the remainder accordingly. Child 8, who has absolute pitch, could remember the motifs accurately and consistently engaged in the task. I used the strategy for Child 11 to teach the motif by dividing it into parts. Child 11 enjoyed the task and engaged in both sessions. Consequently, Child 8 and Child 11 registered the highest engagement.

Table 58. Scenario 1

Researcher's action:	The researcher implemented I.4.C.1 and deliberately played an incomplete motif to prompt the child to complete the remainder.
Child's reaction:	The child was not able to complete the motif.
Analysis:	There are three possible reasons for this outcome: A joint attention problem was evident in Child 9, who did not seem to understand the task. When I played an incomplete motif and waited for a response, he offered no reaction. Concentration level was a problem for Children 8 and 9, who first engaged in the task but became distracted halfway through it, perhaps by the surroundings, and looked around the room even though no one else was in it. Memory could also be a reason. Neuroscientists often treat executive function as an umbrella term which comprises a vast network of cognitive and behavioural skills and processes that are required to plan, initiate and follow through with activities. Previous research described executive function as 'a complex set of cerebral processes that operate in non-routine situations and exert top-down, volitional control over cognition and behaviour' (Daffner & Searl, 2008). One area of executive function which is frequently discussed in relation to ASC is working memory.

	Pennington and Ozonoff (1996) discussed working memory as a component of executive function in view of its role in the organisational aspects of memory as well as in goal-directed behaviour. Working memory refers to the ability to simultaneously store and process information. Research found evidence of working memory deficits in individuals with ASC across a wide range of chronological and mental ages (Geurts et al., 2004; Ozonoff, 1997; Verte et al., 2006). Therefore, the children's disengagement from the task could be associated with the deficit in working memory, which would suggest that they need a longer period of time to remember and memorise the materials they receive.
Researcher's thought process and action:	Taking into consideration all of the factors above, I used this strategy in conjunction with P.4.A.2 to provide visual cues to help children in remembering. Furthermore, to enhance memory, I could return to strategy R.4.A.1 to play for the children and then support them in playing the motif again, and I could apply P.4.A.1/P.4.A.2 or I.4.B.1 to reinforce their memory for learning the motif. For Child 9, who lacked an understanding of the task, I implemented strategy I.4.C.2 as guidance for completing the remainder of the motif.

Strategy 2 (I.4.C.2)

The teacher uses visual cues, such as pointing to the keys to help the child start at the correct note.

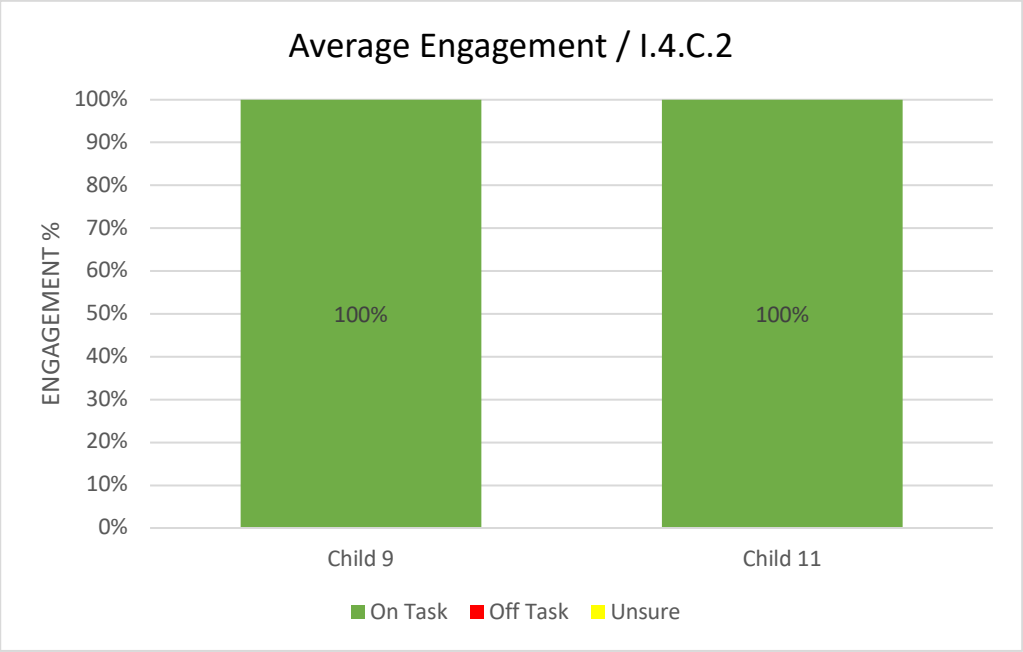


Figure 38. Average engagement of Child 9 and Child 11

Figure 38 illustrates that the strategy was effectively implemented for Children 9 and 11. I did not implement the strategy with Child 8, as she possesses absolute pitch and could already remember and accurately imitate the materials. Additional visual cues can reinforce the learning of materials and enhance memory.

Table 59. Scenario 1

Researcher's action:	I implemented strategy I.4.C.2 by providing visual cues to prompt the children to complete the remainder of the motif.
Child's reaction:	The children engaged by looking and were able to complete the motif. After several attempts, they completed the motif without prompting.
Analysis:	Providing appropriate scaffolding can reinforce a child's learning and improve his or her engagement with a task. For Children 9 and 11, who do not possess absolute pitch, an alternative strategy should be considered to promote memory and learning of the materials. The tested strategy was effective for guiding children

	in every step through appropriate support, such as pointing to or naming the correct keys, to help the children recognise and complete the motif.
Researcher's thought process and action:	The strategy proved to be effective in teaching the children to recognise incomplete motifs. Therefore, I continued to use this approach to teach them to complete the remainder of the motif. This strategy can be used in conjunction with P.4.A.1, wherein I held the child's hand to complete the remainder of the motif.

In summary, these strategies effectively assisted the children in learning the motif and enhanced their memory. Deliberately playing incomplete motifs and pausing for the children to complete them forced the children to develop their memory skills, which enhance their working memory. Moreover, the strategy was effective in helping the child who had difficulty in learning to imitate the whole motif at once. By dividing the motif into shorter parts, the child was able to learn it gradually until expanding to the complete motif.

6.3.6 Interactive: Element D

This element approaches or corresponds to Level 5. Specifically, the child can play the piano with extended material, which leads to playing simultaneously with the teacher.

Strategy 1 (I.4.D.1)

The child takes turns in playing motifs with the teacher, or they play simultaneously. This strategy can be combined with P.4.A.1 or P.4.A.2 to help the child recognise the motifs.

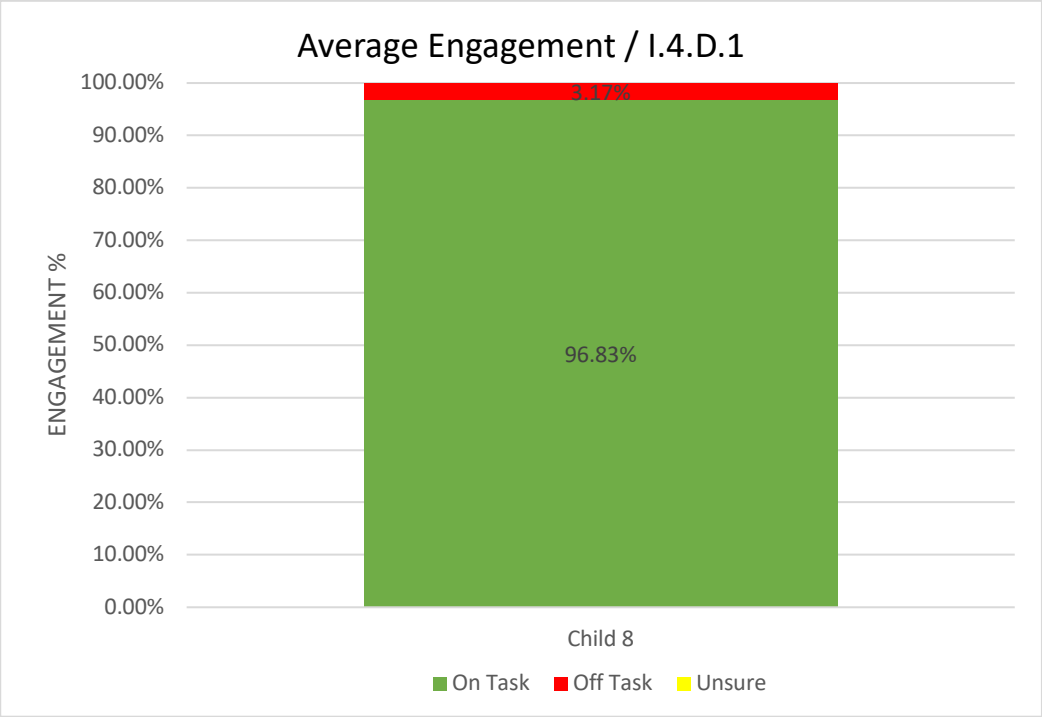


Figure 39. Average engagement of Child 8

I implemented this strategy only with Child 8 since achievements at higher levels are dependent on those in preceding levels. The ability to play simultaneously with me required a high level of concentration and integration between cognitive, motor and auditory processing. It also involved joint attention as well as interaction between the child and me.

Table 60. Scenario 1

Researcher's action:	I implemented I.4.D.1 and played together with the child.
Child's reaction:	The child engaged throughout and was able to play together with me.
Analysis:	Child 8 engaged in almost all of the tasks that involved playing together with me. However, in session 5, she disengaged from the task several times. Such disengagement may have been due to a variety of reasons. The first possibility concerns concentration and attention level.

	Child 8 may have lost her concentration when playing together with me and disengaged from the task to look around the room. Playing simultaneously with another person requires more attention, as the players need to focus on their own playing as well as that of others. Child 8 was in the developing stage of her ensemble skills and might have disengaged from the task because of a decrease in her attention level. Another reason could be joint attention problems. Child 8 was still developing her joint attention skill and becoming familiar with playing with me, which could cause her to disengage from the task from time to time.
Researcher's thought process and actions:	Child 8 is evidently approaching Level 5 in her musical development. The next step is to expose Child 8 to a variety of musical genres and expand the materials.

In summary, this strategy taught the children to take turns with others, which contributes to ensemble skills, which emerge at Level 5 of SoI.

6.4 Musical Development of the Children in SoI Framework

The musical development progress of the three children was mapped along the SoI framework with the software from the SoI website. The underlying assumption is that effective strategies increase the musical development children. The graphs

below present the results of the progress.

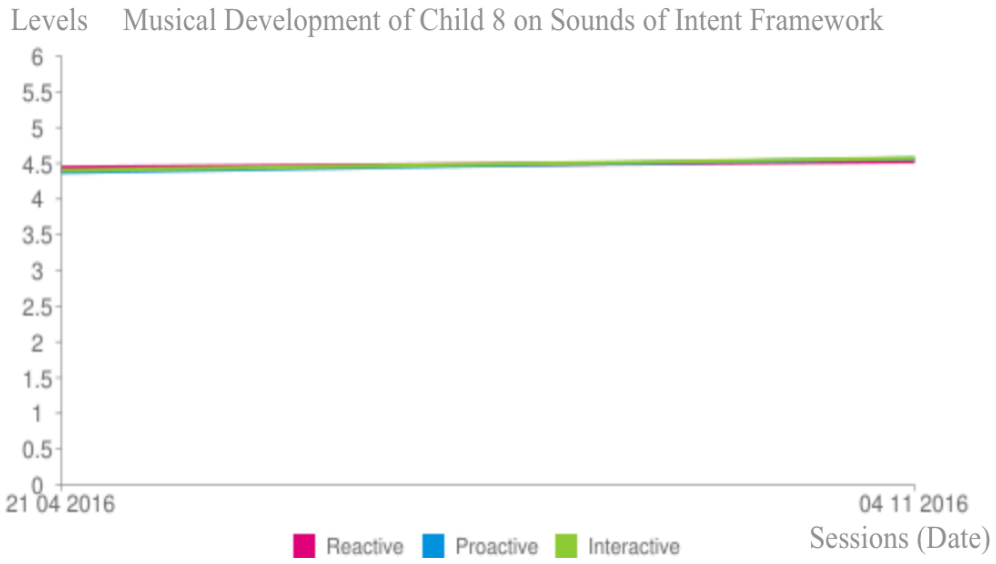


Figure 40. Progress of musical development of Child 8 over the course of sessions

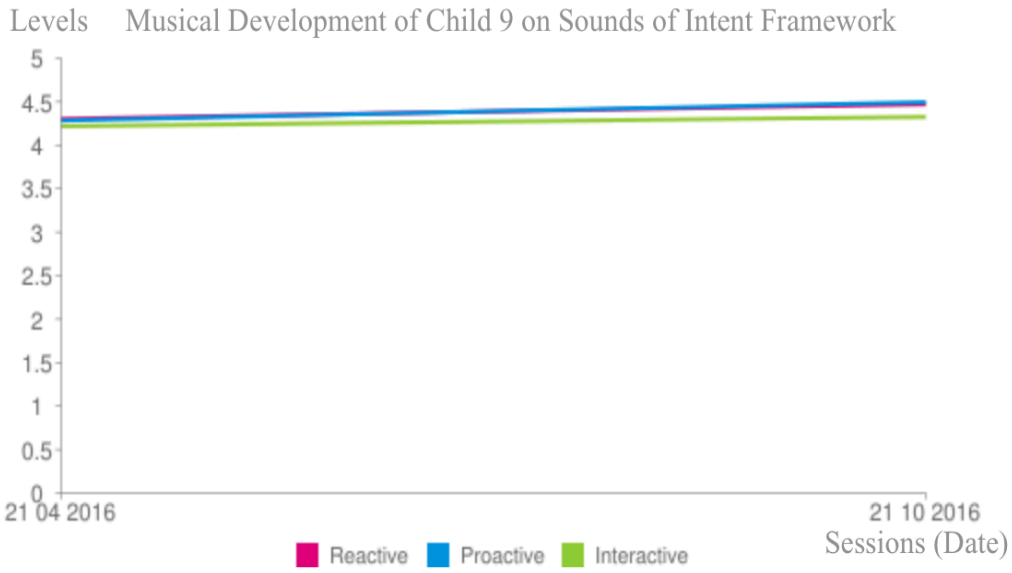


Figure 41. Progress of musical development of Child 9 over the course of sessions

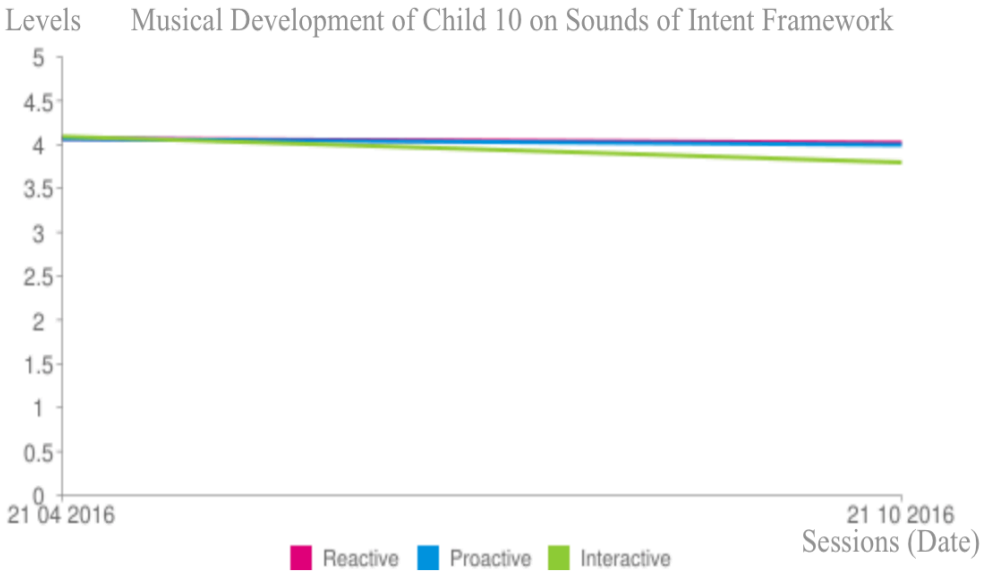


Figure 42. Progress of musical development of Child 10 over the course of sessions

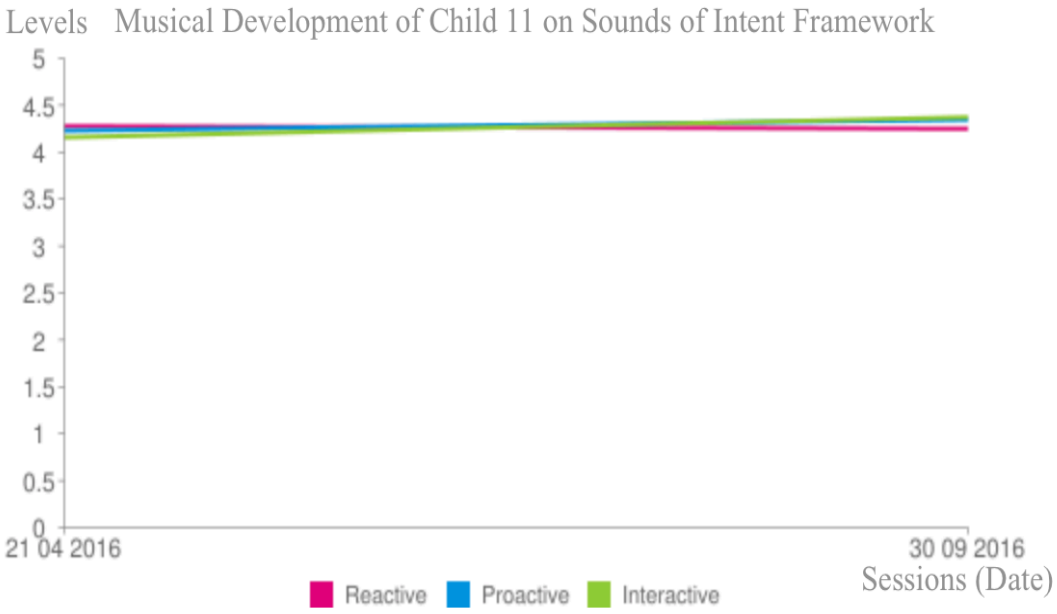


Figure 43. Progress of musical development of Child 11 over the course of sessions

Over the course of the sessions, although each child received a different number of sessions, one can see that there is a clear upward trend in all domains in respect of all children except for Child 10, who expressed verbally that he did not want to participate and was feeling distressed and was withdrawn. For children 8, 9 and 11, one can see that by offering appropriate support, even without prior knowledge of playing the instrument, they could learn to recognise and create musical motifs on the piano without my support thereafter.

Figure 43 reveals that Child 11 experienced a slight decrease in the reactive domain, which may indicate ineffectiveness of the strategy. However, another explanation could be difficulty with sensory integration, which hinders children from linking incoming data from different sensory modalities. During this project, Child 11 confronted an environment, an instrument and a new teacher that were completely new to him. Furthermore, my playing on the instrument may have induced sensory oversensitivity that triggered the child to disrupt the session by playing random keys to block out the sound. Moreover, the child's behavioural challenges might include difficulty with sitting and listening attentively. The strategies above were evidently effective in teaching children at Level 4 to recognise and create musical motifs on the piano. Nevertheless, other factors that may have affected the results might include the following:

1. Children's growing familiarity with me and the routine of the sessions, which may have enabled them to engage and interact musically more fully as time went on; and
2. My deepening knowledge of all four children, which may have enabled her to scaffold the children's interactions more effectively as the sessions progressed.

6.5 Discussion

One strategy in the reactive domain was developed and tested with the participants alongside with two proactive strategies and six interactive strategies. This section discusses the findings.

6.5.1 Reactive

Children who function at Level 4 start to recognise short, distinct melodic phrases. This development corresponds with Trehub's (2010) research on children's early cognition of musical sounds and structures, which reported that infants have the capability of structural processing in the domains of pitch and perceived time. With these abilities, young children can perceive patterns and mentally group sounds in relation to both melody and rhythm. The strategy I used in this domain employs the auditory modality to teach children to recognise musical motifs. The children were constantly exposed to repetitive listening of musical motifs. The results of engagement among children varied: Child 8 and 9 registered high engagement rates of 87.57% and 92.60%, respectively, during the strategy's implementation; Child 11 demonstrated an average engagement of 56.67%, but his engagement reflects an upwards trend over his first four sessions, which signals the effectiveness of the strategy.

Child 10 was the only child with little to no engagement throughout all sessions, which was due to unsettling behaviour wherein he verbally communicated 'No' during all piano activities and refused to participate. In view of his constant signs of distress, I had to end the participation of Child 10.

Overall, the strategy was effective in teaching the recognition of musical motifs on the piano, as all three children met the success criteria of the piano curricular framework and eventually recognised the musical motifs. They conveyed this recognition through their facial expressions when I played musical motifs as well as their engagement in

reproducing those motifs on the piano.

6.5.2 Proactive

Two strategies were developed in this domain. P.4.A.1 uses the kinaesthetic modality to teach children musical motifs to which they have listened by holding their hands or employing the hand-under-hand technique. I worked on the assumption that children at Level 4 can recognise and create musical motifs even without prior knowledge of the instrument. The results indicate that all children besides Child 10 illustrated high engagement during the strategy's implementation, which supports its effectiveness in engaging and teaching children to produce musical motifs.

Since some children with ASC exhibit tactile defensiveness, I applied P.4.A.2 to accommodate the kinaesthetic modality by using visual prompts and cues, such as pointing to the accurate keys. Except for Child 10, all children registered high engagement, with Child 11 scoring a 100% engagement rate when I used the strategy. Such high rates distinguish the strategy as particularly useful for children who are reluctant to be touched.

The qualitative analysis reveals that children with ASC who have learning difficulties can benefit from multimodal learning. The results for all children illustrate such benefits, and I used both strategies to teach musical motifs. Overall, the strategies were effective, as the children successfully created musical motifs without physical prompting from me. Children 8, 9 and 11 also displayed an increase in musical development throughout the sessions, which reflects that the use of the piano and the strategies were effective in promoting the children's musical skills. Child 10 was reluctant to participate, so no engagement occurred in any sessions, and he exhibited a decrease in musical development.

6.5.3 Interactive

In the interactive domain, the piano facilitates joint attention activities, such as call and response, to promote musical skills and interactive play. Strategies in the interactive domain involve four elements. For element A, the strategy advances the concept of imitation. I worked on the assumption that the child expected a response from me after creating a musical motif on the piano. Only three children participated in this strategy (Children 9, 10 and 11). The results depict an increase in engagement. Moreover, both Children 9 and 11 sustained high engagement throughout the session when I implemented the strategy. The strategy therefore seemed effective, and providing an appropriate response, such as imitating the children's playing, developed their consciousness of recognising an imitation of their own playing. Child 8 had never initiated a motif, so I did not implement the strategy with her. Core impairments of children with ASC include deficits in social communication and social interaction (APA, 2013). It is common that children with ASC find it difficult to initiate an interaction or do not know how to. Even though the child did not initiate interaction, Child 8 liked to imitate my playing and took turns with me. Child 10 did not participate in any piano activities.

For element B, two strategies were developed to teach imitation. Strategy I.4.B.1 required sufficient time and pauses for the children to imitate the musical motifs. Their engagement fluctuated throughout the sessions, but they measured a high average engagement overall, which implies that the strategy effectively engaged the child in imitating my playing. They were also able to accurately imitate my materials without support, which fulfils the success criteria of the piano curricular framework. This strategy was particularly useful for children who have absolute pitch, as evident from Child 8, who has this trait and learned to create musical motifs mostly through

imitation. This observation corresponds with studies by Ockelford (2008; 2013) which reported that individuals with absolute pitch at or above Level 4 learned to play an instrument mainly through imitation.

To address Child 9 and other children who struggled to accurately imitate the materials, I developed strategy I.4.B.2, which uses visual cues. The results reveal high engagement of Child 9 and thus demonstrate the effectiveness of the strategy for teaching imitation of musical motifs.

To learn to play the piano, children with ASC and learning difficulties can benefit from a combination of strategies with different learning modalities which draws upon their individual strength and learning style. For element C (I.4.C.1), I deliberately played incomplete motifs and paused to allow the children to complete them. I employed this scaffolding strategy to enhance memory skills by recalling previously learned motifs. The results indicate that only Child 8 and Child 11 exhibited high engagement (>80%) when I implemented the strategy. Meanwhile, Child 9 and Child 10 may not have developed long-term memory skills to recall familiar motifs.

Strategy I.4.C.1 can be a standalone strategy in teaching children motifs. Child 11 learned to remember his musical motif through this strategy, whereby I deliberately played an incomplete motif for him to complete and gradually expanded the material until he could reproduce the complete motif at the end of the session. While I.4.C.1 relies solely on the auditory sense, I.4.C.2 provided visual cues through which Child 9, who had yet to develop long-term memory skills, could reinforce the learning materials and gradually enhance memory skills. The strategy was effective, as the child had 100% engagement in all sessions when I implemented I.4.C.2. Overall, both I.4.C.1 and I.4.C.2 were effective in scaffolding the children to recall motifs, and the

strategies can be combined to complement each child's learning needs.

In view of the notion of capability, the last strategy, I.4.D.1, was implemented only with Child 8. Strategy I.4.D.1 supported the child in taking turns or playing simultaneously with me, which yields progress towards Level 5 of SoI in learning longer motifs and, eventually, the full piece. The results indicate that the strategy was effective in teaching child to take turns with the teacher, which can lead to learning extended materials. The child registered high engagement (>90%) in all sessions, was able to take turns without support and could play simultaneously on some occasions.

When they received the appropriate support, the children at Level 4 learned to recognise musical motifs and create them on the piano without prior knowledge of the instrument. This development corresponds to Vygotsky's (1978) and Bruner's (1975) ideas of scaffolding, which involves an adult controlling elements of the task that are initially beyond the learner's capacity. Such control permits the learner to concentrate on and complete those elements that are within his or her range of competence. The cases of Children 8, 9 and 11 support this concept, as they were able to create musical motifs at the end of the sessions with minimal or no support from me.

Overall, the strategies, which are based on the different learning modalities of the children, were effective in teaching the children to recognise and create musical motifs on the piano, which in turn promotes musical skills. Children 8, 9 and 11 advanced their musical development over the course of the sessions. Traditional piano pedagogies are heavily dependent on one approach (see Chapter 2), but children with ASC who have learning difficulties benefit from multimodal i.e. aural, visual and kinaesthetic forms of music acquisition. All four children at Level 4 demonstrated this claim, as they were able to learn through imitation (visual and auditory) with

additional support, such as visual cues, the hand-under-hand technique or holding their hands.

Some of the children who functioned at Level 4 may have exhibited music-related behavioural traits that resemble those of musical savants. Such traits include extraordinary memory and absolute pitch, as in the case of Child 8, who was able to remember all of the materials from previous sessions without any practice sessions. In addition, her absolute pitch enabled her to hear musical motifs inside her head and then accurately produce them on the piano. It is the absolute perception of pitch that drives her towards the instrument, which corresponds to the initial idea of the project: that the piano is a suitable instrument to engage children with ASC who have learning difficulties in order to promote musical skills, as it offers immediacy and consistency of sound. Thus, as a particularly useful medium for direct repetition and imitation, the piano is suitable for children with ASC who seek regularity, simplicity and consistency.

Although the developed piano strategies were effective in teaching the children to recognise and create musical motifs, their implementation was decisive and based on the teacher's thought process and decisions, which influenced the children's engagement in their learning process. Providing appropriate responses to the children's reactions can enhance their musical learning and tailor the strategies to their individual learning needs.

6.5.4 Summary of Musical Profile of Children 8, 9, 10 and 11

Table 61 summarises the engagement of all participants at Level 4 in each strategy. All children met the success criteria of the piano framework with the exception of Child 10, who was reluctant to participate throughout the study. The fulfilment of success criteria reflects that the strategies were effective; nonetheless, the rate of learning was dependent on each child's ability.

Table 61. Summary of the engagement of Children 8, 9, 10 and 11

Level 4										
Domains	Reactive	Proactive		Interactive						
Strategies (Modalities)	R.4.A.1 (A)	P.4.A.1 (K.A)	P.4.A.2 (V.A)	I.4.A.1 (V.A)	I.4.B.1 (V.A)	I.4.B.2 (V)	I.4.C.1 (V.A)	I.4.C.2 (V)	I.4.D.1 (V.A)	Combination of Strategies
Child 8	●	●	●	-	●	-	●	-	●	Y
Success	Y	Y		N	Y		Y		Y	
Child 9	●	●	●	●	●	●	●	●	-	Y
Success	Y	Y		Y	Y		Y			
Child 10	●	●	●	●	●	-	●	-	-	N
Success	N	N		N	N		N			
Child 11	●	●	●	●	●	-	●	●	-	Y
Success	Y	Y		Y	Y		Y			

Notes: A=Auditory modality, K=Kinaesthetic modality, V= Visual modality, Y=Yes (use of combination of strategies, N=No (no combination of strategies), ● Engagement 70-100%, ● Engagement 40-69%, ● Engagement 0-39%, box with (-) =did not use the strategy, Success (met success criteria on the piano framework)=Y and N=did not meet the success criteria)

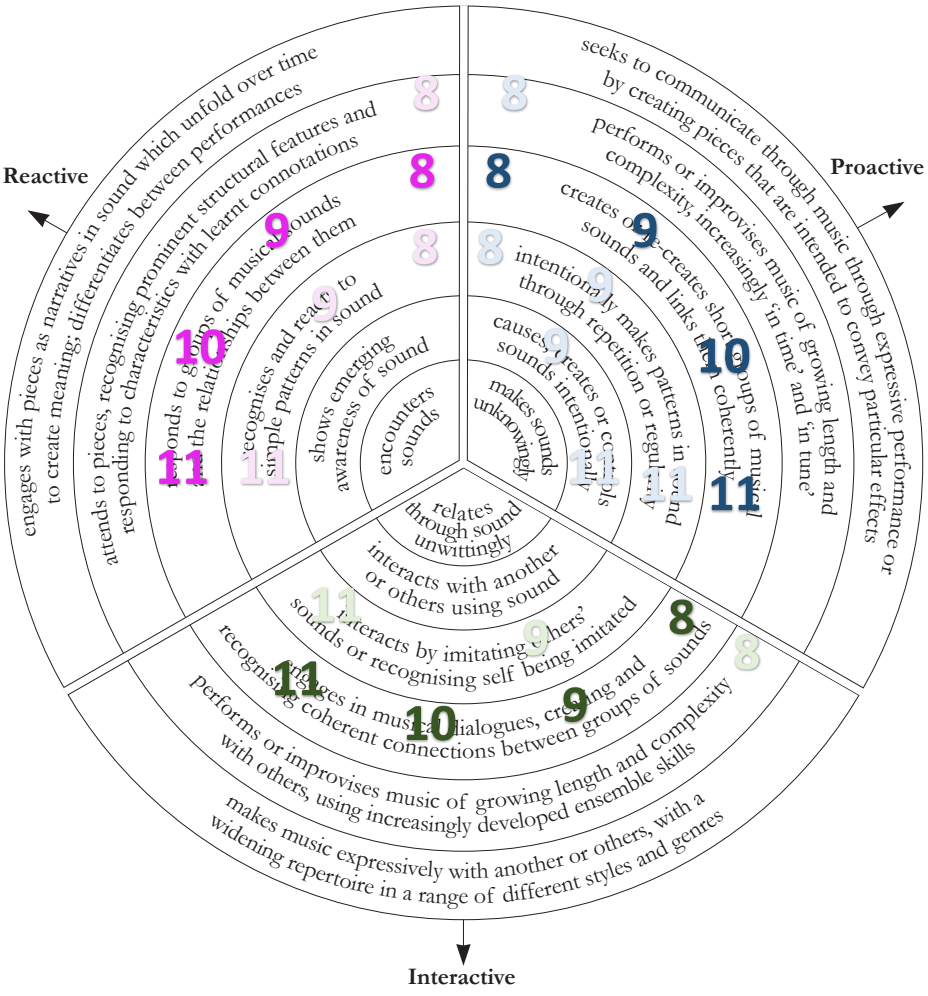


Figure 44. Concentric profile of Children 8, 9, 10 and 11

The concentric profile in Figure 44 illustrates the children's musical development over the course of the sessions. Overall, the profile reveals progress in all of the children's musical development over the course of sessions, except for Child 10. The profile also demonstrates an outwards movement whereby the children engaged in more complex musical behaviours across all three domains. For instance, Children 8, 9 and 11, who displayed musical behaviours at Levels 2 and 3 at the start of the study, moved towards Level 4 after several sessions and engaged highly at this level. Child 8 was the most advanced student of all and advanced towards Level 5. A stack profile of each child is also presented in Table 62.

Profile of Child 8					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	4	P3	3	I3	0
R4	93	P4	95	I4	96
R5	3	P5	2	I5	4
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 9					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	3	I2	0
R3	8	P3	6	I3	4
R4	92	P4	91	I4	96
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 10					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	0	P3	0	I3	0
R4	100	P4	100	I4	100
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 11					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	2	I2	0
R3	4	P3	3	I3	5
R4	96	P4	95	I4	95
R5	0	P5	0	I5	0
R6	0	P6	0	I6	0
	100		100		100

Table 62. Stack profile of Child 8, 9, 10 and 11 over the course of the sessions

6.6 Conclusion

This chapter has presented strategies that were effective in teaching the children at Level 4 to create simple motifs on the piano, with the exception of Child 10, who constantly felt distressed and reluctant to participate in any activities and was therefore dismissed from the study. The results indicate that the most effective strategies were matched to the children's levels of musical development, adapted to their preferred learning styles and often multimodal i.e. visual, auditory and kinaesthetic. However, the findings for Child 8 imply that children with ASC who possess absolute pitch prefer to learn via imitation.

Chapter 7. Level 5 Results

7.1 Introduction

This chapter discusses the outcomes of strategies that I applied with SoI Level 5 participants. Its layout follows that of Chapter 4, and Chapter 3 details the methodology.

7.2 Background of participants

7.2.1 Child 12

Child 12 is a black Ghanaian male with ASD who was 15 years old when he joined the project. He generally communicates by taking an adult to the item that he wants or by using a few single words or short phrases. He can understand instructions at the level of three to four keywords. He has difficulty with open questions and will repeat a question if he is unsure. A brief musical description follows from his music teacher:

> Child 12 is very musical and is always ahead of the others during music lessons; however, he likes to do things in his own way and does not always follow the instructions. He likes playing on the keyboard with backing track. He is rhythmical and proactive during music lessons. He does not interact very well.

7.2.2 Child 13

Child 13 is a white male who was 10 years old when the project was carried out. He was diagnosed with ASD with global developmental delay. He is able to concentrate on an independent activity for at least half an hour, and he asks for help when he needs it. Child 13 has difficulties with comprehending questions and sentences; therefore, he sometimes repeats questions instead of answering them. He can communicate with simple words and sentences and often speaks in third person using his name instead

of using ‘I’. Child 13 was assessed as a SoI Level 5 student and had no prior experience in learning any instruments. The music teacher described him as follows:

> A very musical child and enjoys singing in the choir. He is interactive in music and very rhythmical. He can sing in tune and often in time.

7.2.3 Child 14

Child 14 is a black African male who was 16 years old when he participated in the project. He was diagnosed with ASC with severe communication and social difficulties and significant learning difficulties. He is learning to communicate using simple words and sometimes repeats others if he does not understand their statement. Child 14 has a very short concentration span, so his attention wanders easily, and he becomes distracted by his surroundings. A short musical description from the music teacher follows:

> Child 14 is interested in music. We went on a concert trip to London Symphony Orchestra; he listened attentively throughout the concert. He is very focused during his music lessons and is able to pick up songs very quickly. He likes to sing solo and, most of the time, quite accurately. He is drawn to jazz from the thirties. He can pick up a song within two lessons. He is very rhythmical and interactive in music.

7.3 Results: Strategies in Level 5 of SoI framework

At Level 5 of SoI, the framework expects children to have cognition of the abstract frameworks of pitch (imaginary intervallic ladders on which notes can be hung) and time (a regular beat that underpins rhythm) (Ockelford, 2013). These frameworks are common to all music, as they are highly structured and repeatedly feature minute differences between pitches and the onset of notes. Children at this level gain

awareness of these frameworks, consequently perceiving pieces as holistic entities and recognising the prominent structural features of the pieces. For Level 5, this project tested two reactive strategies, seven proactive strategies and three interactive strategies.

7.3.1 Reactive: Element A

Active listening is a crucial first step in musical development. It is important to provide opportunities for children with ASC to listen to a range of pieces, starting with features of sound that they are known to like or songs for which they have demonstrated a preference. Gradually, the children will start to attend to pieces of music as complete entities and maintain consistent concentration. They may become familiar with an increasing number of different pieces – and potentially of increasing length and complexity – and develop a preference. As a result, they will produce music with which they are familiar (P.5.A1) and interacting with others by, for example, playing simultaneously with other musicians (I.5.A). According to Trehub and Degé (2015), the musical skill level is ultimately affected by the quality and extent of musical exposure, which, in combination with musical training, improves the detection of contour and interval information, which helps in music making (Fujioka, Trainor, Ross, Kakigi & Pantev, 2004).

Strategy 1 (R.5.A.1)

The teacher plays songs or pieces to which the child has listened at home or school and then extends the child's exposure to a wider range of pieces and can potentially incorporate pieces of increasing length and complexity. The teacher can label the piece verbally or through other means, such as the use of PECS, to allow them to be referenced in future choice making.

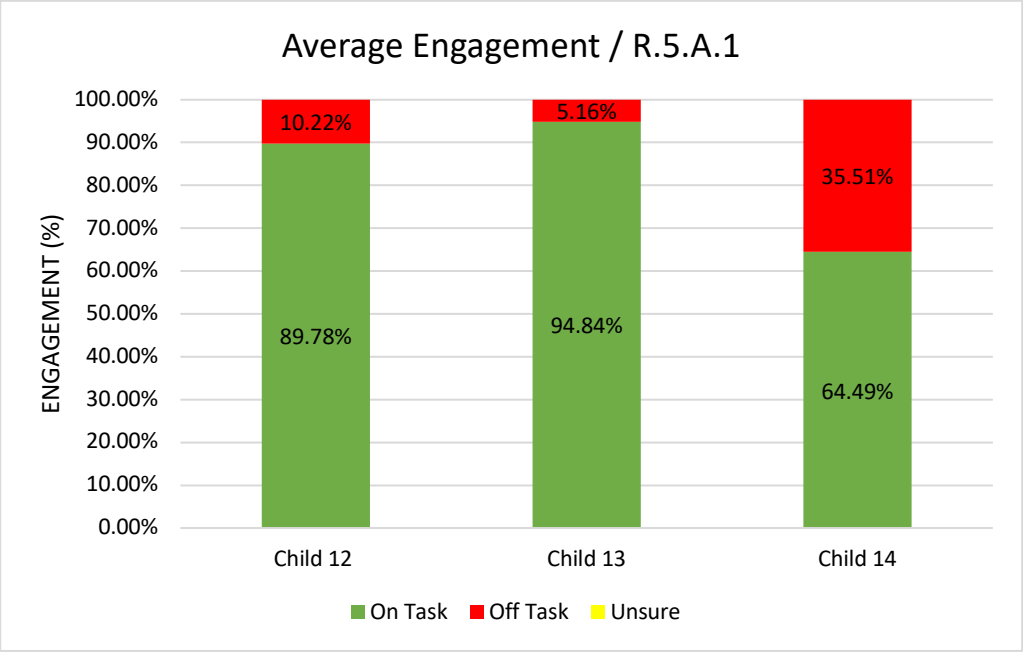


Figure 45. Average engagement of Child 12, Child 13 and Child 14

Figure 45 indicates that Child 12 and Child 13 registered a higher percentage of engagement in the task compared to Child 14, which could be due to several possible reasons. The scenarios below were developed from the observational analysis.

Table 63. Scenario 1

Researcher's action:	I first implemented R.5.A.1 by playing familiar pieces for the children and then exposing them to new repertoires of varying musical genres and styles.
Child's reaction:	Child 12 reacted by listening attentively, and he sat throughout the session and watched my playing. He would smile if he enjoyed pieces and verbally requested that I 'play it again'. Child 13 listened attentively throughout all of the sessions. However, he did not develop a particular taste in music. Child 14 listened attentively but inconsistently. His concentration wandered easily, and he looked around the room and started to talk randomly while I was playing. His preference for music also

	fluctuated; in one lesson, he said that he liked 'Twinkle, Twinkle, Little Star', but when I played it again, he stopped me and said that it was a 'baby song'.
Analysis:	The three children expressed different reactions to the pieces I played for them. As I observed, the main reasons for their child's engagement seemed to be their own interest and motivation. According to Harwood and Marsh (2018), motivation drives students to learn about matters that interest them. Child 12, who was motivated by the music that he liked, attended to the session throughout and verbally expressed his enjoyment to me. For Child 13, when I first sought the songs that the child liked, the music teacher did not provide any, as the child liked music in general and always actively engaged in all of the musical activities and songs. Child 13's interest in music was apparent in every session, as he was eager to be near the piano and always listened attentively to all of the music that I played, and he would look at my hand playing the piano and smile. Self-motivation and interest clearly influenced his learning. Eccles (2005) discussed this phenomenon in terms of 'intrinsic interest value' as part of his expectancy value theory of achievement motivation, which explains the values that individuals attach to various choices. Intrinsic interest value refers to the enjoyment that one derives from a task. Some individuals simply enjoy music activities more than others (Child 13), perhaps based on their personality or surroundings. By playing pieces that interest children, they are more likely to participate in the task. A study demonstrated that participants with ASC were more physiologically responsive to

	their preferred music (Hillier, Kopec, Poto, Tivarus & Beversdorf, 2016). It is possible that Child 14 was still exploring the new instrument and had yet to develop an interest in it. Child 14 also had relatively low concentration compared to Children 12 and 13.
Researcher's thought process and action:	The development of preference is a highly complex field. Related research indicates that, regardless of their encultured tastes, people are drawn to complexity and tend to value familiarity. Accordingly, they feel uncomfortable with the unfamiliar, and they learn to focus their perceptions on subtle changes and change their attitudes through learning (Droe, 2006; Iusca, 2016). With this in mind, I continued to play a wide variety of repertoires to expose the children to different musical genres and styles. However, when choosing new pieces, I focused ones with high repetition.

In summary, strategy R.5.A.1 was effective in supporting the children in active listening. I used songs and instrumental pieces that the children preferred to motivate them to engage in the task. I then expanded their listening repertoires and assigned each piece a label, which I conveyed to the child for future reference.

7.3.2 Reactive: Element B

Once a child has been exposed to a variety of musical genres and styles, the repetitiveness of the music might facilitate recognition of its prominent features, such as the chorus of a song, sections of a piece or a pause in each verse of a strophic song. Recognition manifests through responses such as facial expressions or joining in with me.

Strategy 1 (R.5.B.1)

The teacher deliberately plays choruses or prominent features from familiar songs to seek responses from the child. The child engages through listening and becomes familiar with the prominent features of musical pieces or the choruses of songs. The child may also develop and verbally express preferences or convey them through facial expressions.

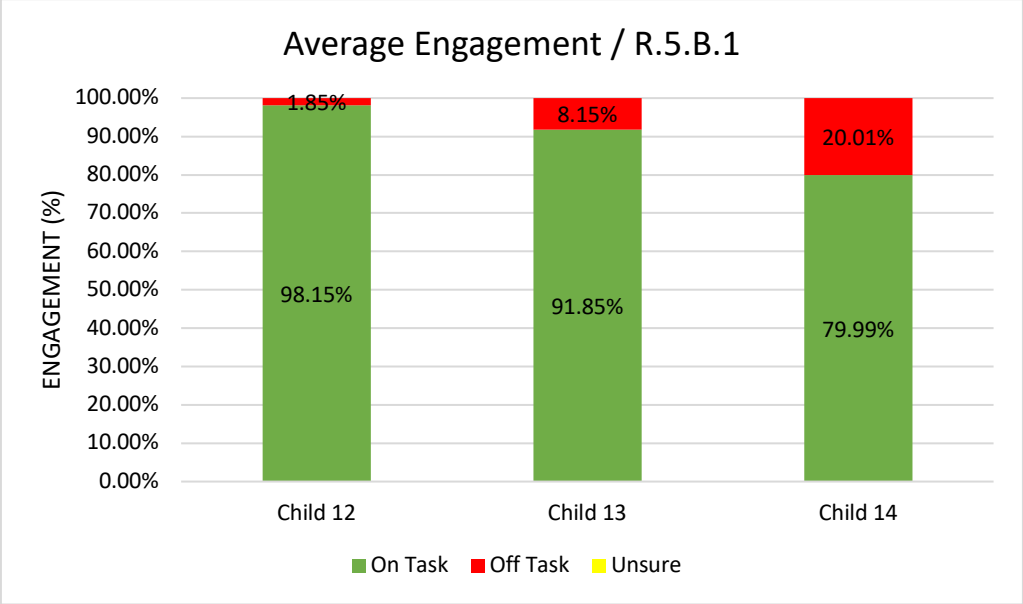


Figure 46. Average engagement of Child 12, Child 13 and Child 14

Figure 46 indicates that all three children measured high engagement in the task and were able to recognise the prominent features of the pieces and the choruses of songs. However, the strategy was not consistently implemented throughout all sessions (see Appendices 18, 19 and 20); I mainly implemented R.5.A.1 to ensure exposure to a wide variety of repertoires. Once they had gained familiarity through several listening sessions, I only implemented this strategy to determine whether the child responded to prominent features or choruses of songs. The following table details the engagement of the children during their sessions:

Table 64. Scenario 1

Researcher's action:	I implemented R.2.B.1 and played prominent features of a piece

	or choruses of a song for the child.
Children's reactions:	When I played the chorus of 'Hakuna Matata' from *The Lion King*, Child 12 smiled and sang along with me. He then requested that I play it again so that he could sing along. Child 13 remembered all of the songs to which I had exposed him and named all titles in the repertoire. When I played 'Twinkle, Twinkle, Little Star', Child 14 sang along. Moreover, when I played 'The Entertainer', he immediately recognised it as the tune from a computer game that he plays — *Super Mario* — and expressed so verbally.
Analysis:	Through extensive and repetitive listening, the children became familiar with the music and developed a preference for some of the music to which they listened. They expressed verbally or through facial expressions that they were familiar with the piece and were able to express their likes and dislikes.
Researcher's thought process and action:	Once the children became familiar with the pieces, the next step was to help them learn to play the piece. I then moved to the next domain — proactive — which involves the children playing simple pieces on the piano and of potentially growing length and complexity. In addition, I continued to implement R.5.A.1 to expose the children to a wide variety of musical genres and styles.

In summary, strategy R.5.B.1 was effective in teaching the children to recognise prominent features of songs through repeated exposure to the pieces. The strategy also provided motivation to use songs for which the children had already demonstrated a preference.

7.3.3 Proactive: Element A

After exposing the children to hearing the simple piece, I supported them in learning to play pieces on the piano that were short and simple but of increasing length and complexity over time. The results from previous chapters illustrate that children at Levels 2, 3 and 4 can enjoy creating, controlling and causing sounds through exploration of the piano. However, children at Level 5 require more advanced skills and a higher capacity to plan and reproduce a series of sounds faithfully to an inner intention, in emulation of what is heard and through instruction. This reproduction necessitates several abilities, including a sufficient level of auditory development to process pitch, rhythm and other qualities of sound effectively; a range of motor skills for coordinating the reproduction; and concentration, memory and motivation.

Taking into consideration the learning difficulties and core impairments of children with ASC, I carefully provided appropriate scaffolding to assist the children in achieving these skills to perform pieces of music. According to Ockelford (2013), children with ASC are around 500 times more likely to have developed absolute pitch, and they may not be aware of their unusual skill. Recognition of such skill can inform my plan and a suitable strategy for the child.

Every child learns uniquely and prefers different learning modalities. Therefore, several strategies with various learning modalities were developed to tailor to individual learning needs.

Strategy 1 (P.5.A.1)

The teacher physically supports the child by holding his or her hand to learn the piece. With this strategy, the teacher uses the kinaesthetic modality to teach the child to play the piano.

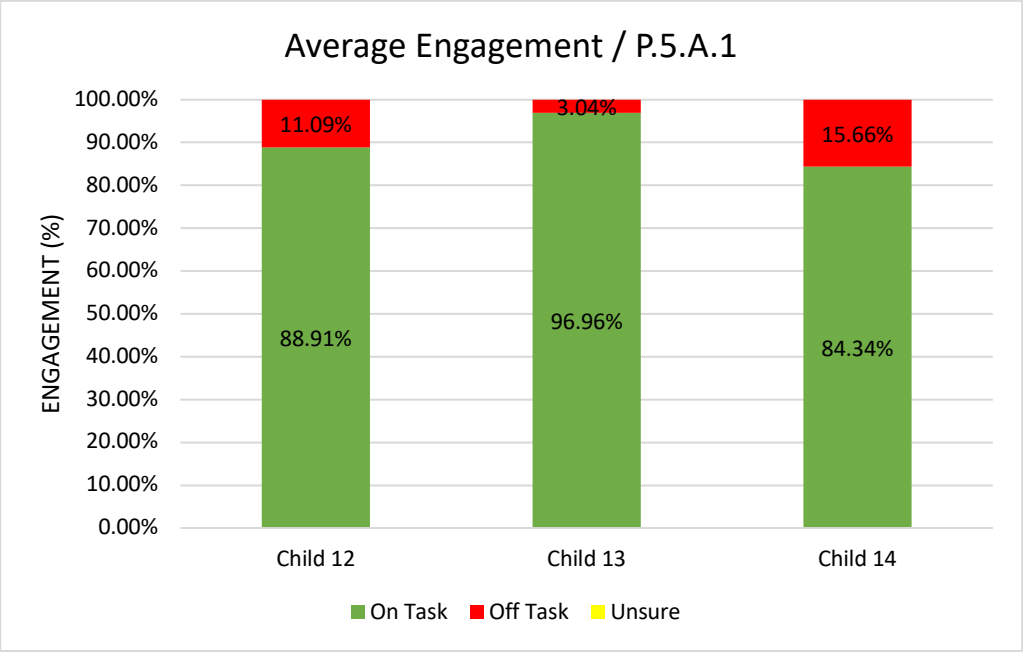


Figure 47. Average engagement of Child 12, Child 13 and Child 14

Figure 47 reports a high percentage of engagement in the task for each of the three children. The strategy was effective in teaching them to play the piece through physical support. The following table contains the three scenarios from the three children:

Table 65. Scenario 1

Researcher's decision and action:	Child 12 is skilled at imitation and prefers to learn pieces via imitation rather than physical support. However, I noticed several times that the child struggled to remember the material and, even with imitation and cues, played the wrong notes. Therefore, I decided to support him physically so that he could see which note to play.
Child's reaction:	Child 12 was able to tolerate the input but not consistently or for long periods of time, as evident in session 6. He would pull his hand away from me once he thought that he could play without support.

Analysis:	Child 12 seemed motivated to play by himself. According to Ockelford (2008), some children at a high level of SoI (Levels 5 and 6) often have a determination to make music which drives them forwards. In this case, Child 12 could tolerate the input by allowing me to help him; however, he was also self-motivated to play.
Researcher's thought process and action:	To help the child effectively learn the piece, I combined several strategies. When he was reluctant to be held, I changed the strategy to P.5.A.2, wherein I used imitation and cues to assist him.

Table 66. Scenario 2

Child's action:	While learning a piece, Child 13 liked to imitate my playing. However, when he was struggling with the material, he would grab my hand for physical support to indicate for him the correct materials before he reproduced the materials by himself.
Analysis:	Child 13 was again motivated by his own interest in learning the piano through proactive interaction with me. His absolute pitch drove him to reproduce the materials without my support, and it was only when the child struggled to recall materials that I showed him the correct keys to play. He had a high percentage of engagement on the task with the exception of in session 4, when he became upset that a key was broken on the piano and the labels on the keys were peeling away. The evidence of Child 13 clearly supports that some children with ASC can be easily distracted by external stimuli or the surroundings; therefore, it is important to ensure that surrounding disruptions are at a minimum when working with such children. Besides the distraction, Child 13 was

	able to focus on the task and tolerate my input.
Researcher's thought process and action:	Child 13 was highly motivated to learn the piano, as apparent from his eagerness to attend the session every week as well as his attention level during the sessions. With absolute pitch, Child 13 was able to recall pieces that he had learned from previous lessons even when practice was not available. He was also motivated to learn the material and proactively sought assistance when struggling to remember. He did this in several events by grabbing my hand so that I could point out or physically guide him to the accurate notes. I recognised that Child 13 preferred to learn pieces by ear; therefore, I used this strategy mainly as an alternative strategy when Child 13 struggled to remember materials.

Table 67. Scenario 3

Researcher's action:	I used strategy P.5.A.1 to support Child 14 in learning to play pieces to which the child had listened, e.g. 'Ode to Joy', 'Minuet in G' by Bach and 'Twinkle, Twinkle, Little Star'.
Child's reaction:	Child 14 engaged with the task most of the time but occasionally disengaged and pulled his hand away, signalling reluctance to accept my help.
Analysis:	General cognitive attributes, such as concentration and memory, may contribute to a child's engagement in a task. The engagement of Child 14 fluctuated throughout all sessions, which was due to the child losing concentration and becoming distracted halfway through the lesson. This occurred on several occasions, wherein he initiated a conversation while I was guiding him in playing the correct materials on the piano. The session was thus interrupted by

	attempts at conversation and random questions. I had to stop the session and tried to redirect his attention back to the session. On one occasion, the child refused my help and said, 'I'm 16, big boy, no help'. This statement may have been caused by lessons that encourage him to become independent. Accordingly, I had to change strategies to teach the child to play the piece.
Researcher's thought process and action:	Several factors contributed to the child's disengagement from the task. It was important for me to be sensitive to the child's learning needs and guide him accordingly. In this scenario, when the child was distracted and attempting to make conversation, I tried to draw his attention back to the session through the use of simple verbal instructions, such as 'piano first', 'continue' or 'talk later'. When the child was reluctant for me to physically support him, I change to another strategy (P.5.A.2) to teach the child to play the piece.

Strategy 2 (P.5.A.2)

To overcome tactile defensiveness, this strategy employs imitation, cues and prompting. These techniques i.e. imitation, cues and prompting are also known as rote learning, wherein the teacher plays a short section and the child imitates it afterwards.

According to Frazee and Kreuter (1987), the ability to imitate forms the basis of tonal and rhythmic memory, as students echo the patterns that are played by the teacher. According to Treffert (1989/2000), memory is the common thread through all savant skills. Although the participants were not regarded as savants, children at Level 5 may exhibit similar traits to savants, including powerful memory skills and absolute pitch, which drives them to learn at a relatively fast pace. However, some children with ASC have difficulty with imitation (Schott, 2016), so teachers should provide appropriate guidance for such children when they are learning to play a piece. With this strategy,

I scaffolded the children by providing cues, prompts and gestures to help them remember which keys to play.

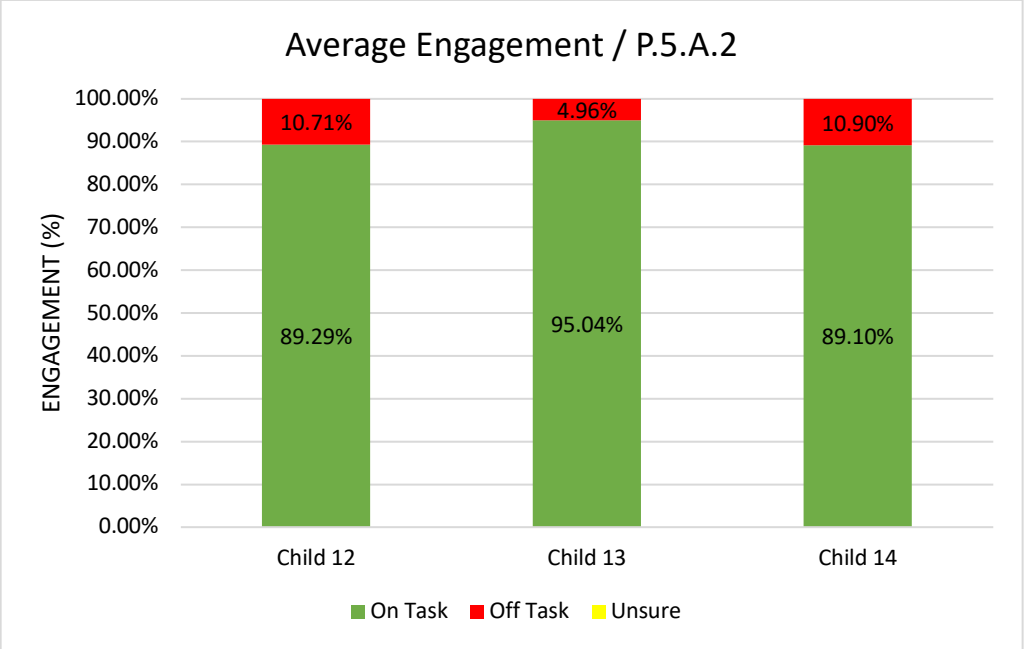


Figure 48. Average engagement of Child 12, Child 13 and Child 14

As Figure 48 indicates, the percentage of engagement on the task was high (>80%), which suggests that the strategy was effective as an alternative to P.5.A.1 for teaching children to learn short pieces. I used demonstration, imitation and cueing to teach the child to play a new piece. Over the course of sessions, I recognised patterns and determined each child's preferred learning style, which the scenarios below discuss further.

Table 68. Scenario 1

Researcher's decision and action:	I noticed that Child 12 and Child 13 had absolute pitch; therefore, they seemed to prefer teacher demonstrations and subsequent imitation of the material. I implemented P.5.A.2 by using imitation to teach the child.
Children's reactions:	Child 12 was able to imitate me accurately most of the time.

	Child 13 exhibited a keen interest in learning all of the pieces that I taught him. He could imitate accurately, and when he struggled to remember the materials, he pulled my hand to the piano so that I could demonstrate them again. Child 14 was able to imitate, albeit less successfully than Children 12 and 13. In compared, he did not have absolute pitch, and he struggled to remember the materials.
Analysis:	The children who have absolute pitch were more accurate in their imitation and preferred to learn by playing by ear. This preference corresponds to Ockelford's (2013) assertion that the sound in the ear leads the hand. The mental imagery of sounds may be more vivid for those with absolute pitch than for those without it, and it is easier for children with ASC who possess absolute pitch to develop instrumental skills, especially on the piano, which involves fixed pitches and simply reproducing a series of sounds that they have just heard and mapping them onto the accurate keys. For Child 14, imitation did not work as effectively as with Children 12 and 13. He relied on visual and auditory memory of my demonstration and required more effort than the two child did since he lacked absolute pitch.
Researcher's thought process and action:	I recognised the learning differences between the three children and modified the strategies to address the issues. I knew that Children 12 and 13 benefitted from playing by ear. Learning by ear through many repetitions of a complete song was a familiar and effective means of advancing one's repertoire for Children 12 and 13. Through this approach, I could include stylistic and

	expressive elements. For Child 14, I adopted multimodal (i.e. aural, visual, kinaesthetic) forms of music acquisition, wherein I combined different strategies to teach the child new pieces.

Table 69. Scenario 2

Researcher's decision and action:	I implemented P.5.A.2 by providing prompts, such as pointing to the key, singing the note or naming the key, when teaching the children new pieces. This strategy was implemented with children who were reluctant for me to hold their hands, which occurred mainly with Child 12 and Child 14.
Child's reaction:	The children engaged in the task most of the time but started to disengage and play random notes halfway through the task.
Analysis:	There are several possible reasons for the observed behaviour. The first reason concerns joint attention. Research indicates that a deficit in joint attention is a core impairment of children with ASC (Baron-Cohen et al., 1992; Charman et al., 1998). Joint attention is vital for responding to a cue or prompt. In this scenario, the children failed to respond to the cues on the keys. The task also required visual processing by looking at the cues and auditory and information processing by remembering the piece and my demonstration. However, studies reported that children with ASC exhibit a delay in processing (Hume et al., 2009; Bogdashina, 2016), which may cause disengagement from a task. Concentration could also be a reason, as all three children started to disengage from the task. Child 12 stopped playing and stared at the piano, Child 13 started to play random keys and

	Child 14 initiated unrelated conversations.
Researcher's thought process and action:	Considering the two possible causes, the first could be addressed by combining the strategy with P.5.A.1 or P.5.A.4 to help the child stay on task. I changed the strategy to R.5.A.1 or R.5.B.1 when the child lost concentration or interest in continuing the task.

Strategy 3 (P.5.A.3)

This strategy uses simple letter notations and sticker labels on the piano keys. This strategy primarily employs the visual modality to teach the child to play the piece by matching the letters on the score to those on the piano.

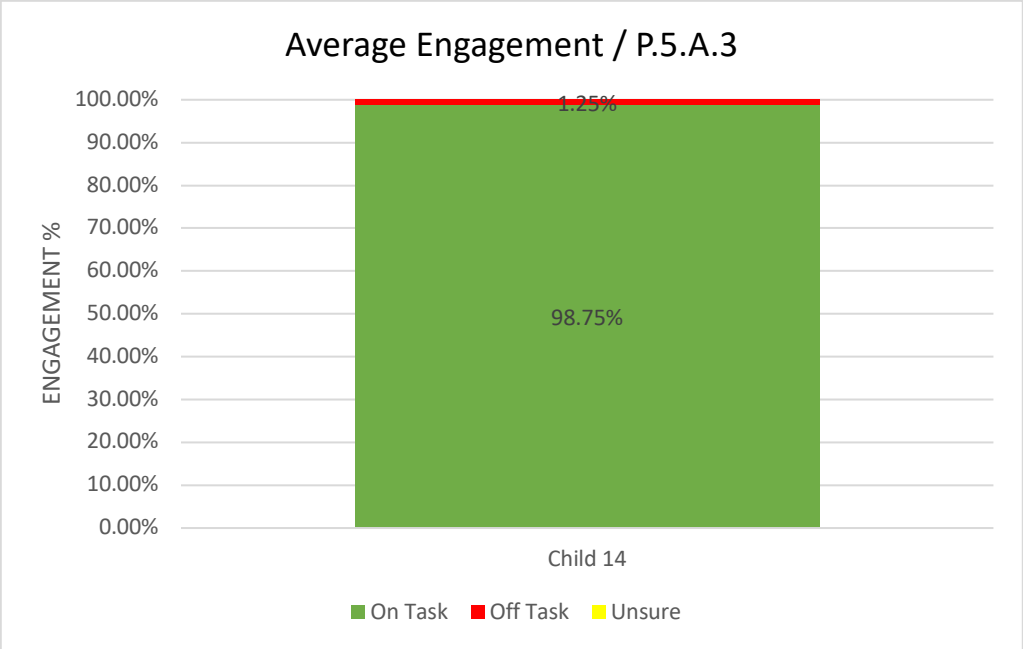


Figure 49. Average engagement of Child 14

I implemented this strategy only with Child 14, who does not possess absolute pitch and had difficulty with learning pieces by ear. Compared to Children 12 and 13, Child 14 had worse memory skills and easily forgot materials that he had learned. Although the three children functioned at the same musical level, they did not possess similar musical skills or functioning, and the core impairments of ASC may affect their

learning abilities. To accommodate Child 14's learning needs, I developed this strategy of utilising visual labels so that he could visualise the notations and match them to the piano keys. The table below presents a scenario from Child 14:

Table 70. Scenario 1

Researcher's action:	I used letter notations to teach Child 14 to play 'Twinkle, Twinkle, Little Star' and 'Ode to Joy'. I sourced from existing repertoires to which the child had been exposed.
Child's reaction:	Child 14 engaged and was able to play both pieces by reading the letter notations and matching the notes to the piano keys.
Analysis:	Child 14 exhibited a high percentage of engagement in the task, which suggests that the strategy was effective in teaching the piece through the visual modality. He was able to focus on the task and engage throughout the session. However, in session 4, he briefly disengaged when he suddenly stopped playing and initiated a conversation with me, thus becoming side-tracked. This behaviour is not uncommon for children with ASC, who are easily distracted as a result of difficulty with sensory integration, which leads to disengagement from tasks. However, I managed to redirect his attention back to the piano, and he resumed focus on the task.
Researcher's thought process and action:	Not all children at Level 5 are able to play pieces by ear or have advanced memory skills for recalling familiar melodies. With this in mind, I changed the strategy to employ visual labels. Once the child was familiar with the material, I encouraged him to play the material from memory or by ear.

Strategy 4 (P.5.A.4)

This strategy is similar to strategy I.4.D.1, wherein the child learns to play pieces by taking turns with the teacher.

At Level 5, children start to learn materials of increasing length and complexity. To this end, I first scaffolded the children to learn the piece gradually and in parts. Only once they had learned the parts well did I extend the material to the full piece.

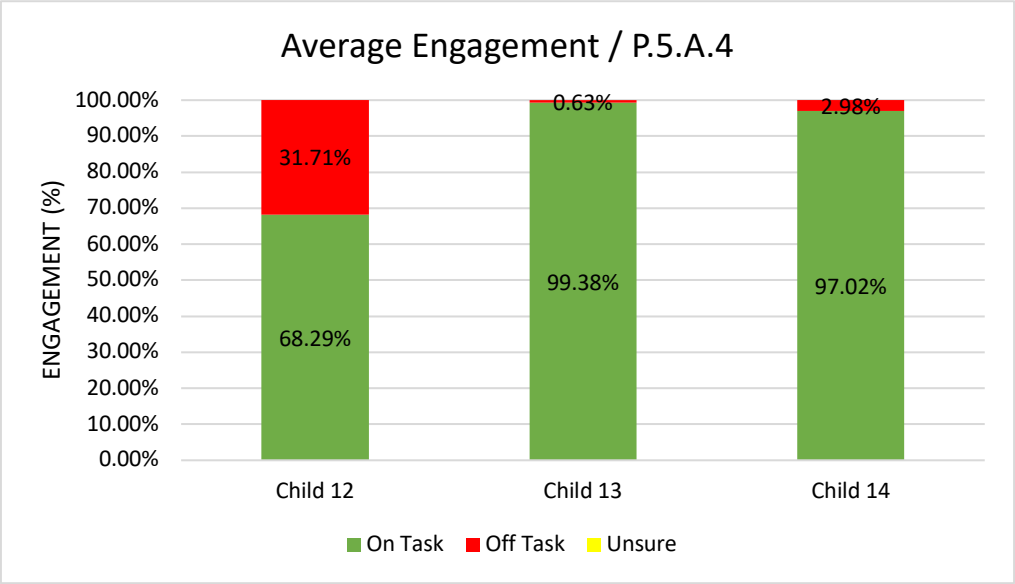


Figure 50. Average engagement of Child 12, Child 13 and Child 14

I did not implement the strategy in all sessions, as each was constructed on the basis of the respective child's preferred learning style. When selecting strategies, I took into consideration the learning modalities of the children, which account for learning differences between individuals (Fleming, 2014; Willingham et al., 2015). The high engagement rate of over 90% in Figure 50 suggests that Children 13 and 14 preferred this strategy, as Child 12, who only participated in two sessions with this strategy, yielded a significantly lower engagement percentage. The table below presents the scenarios of each child.

Table 71. Scenario 1

Researcher's action:	I used strategy P.5.A.4 to teach the child to learn the piece 'Minuet in G'.
Child's reaction:	Child 12 engaged in the task and alternated turns with me while learning the materials. In session 2, the child engaged halfway through and then was reluctant to play when it was his turn.
Analysis:	The child was clearly able to engage in the first session but refused to do so in the second session. The reason is unclear, but several explanations are possible: First, the child may have been demotivated by the choice of music. As opposed to other songs, such as 'The Entertainer' and *The Lion King*'s 'Hakuna Matata' and 'Can You Feel the Love Tonight', the child seemed hesitant to learn this particular piece. Thus, he may have already developed a strong preference for the musical style of pieces by this point. Second, the child has absolute pitch and was highly motivated to independently learn the piece by ear. After hearing the tunes during the sessions, the child often preferred to work out the pitches by himself instead of my help. This determination to play independently may explain the child's disengagement from the turn-taking task.
Researcher's thought process and action:	Taking into consideration the derived insights, I approached the child in two ways: First, since the child seemed uninterested in the piece, I changed to another piece to motivate the child to play. Second, since the child did not like to alternate turns, I adapted

	the strategy to P.5.A.2 so that the child could imitate the materials instead of taking turns with me.

Table 72. Scenario 2

Researcher's action:	I used P.5.A.4 to teach the child two pieces: 'Fur Elise' and 'Minuet in G'. I chose these two songs for their repetition and suitability for division into several more learnable sections.
Child's reaction:	Child 13 engaged throughout the task and took turns with me.
Analysis:	Child 13 had a remarkably high percentage of engagement in all sessions, although he exhibited slight disengagement during the first session. This disengagement can be explained by several possible reasons: First, Child 13 may have lost his concentration and attention while taking turns with me. The piece and activity were completely new to him, and he may have needed time to understand the situation, which could reduce his concentration halfway through the task. Second, a deficit in joint attention is a core impairment for children with ASC and may cause them to respond more slowly during social interaction. In the first session, Child 13 failed to alternate turns with me, but he was capable of doing so throughout all other sessions. Therefore, in session 1, the child was still familiarising himself with the activity becoming comfortable with me as a new acquaintance. The processing of this new information was reflected in his engagement in the task.
Researcher's thought	The child was able to engage in turn-taking, and the strategy

process and action:	was effective in teaching him the new piece, which he eventually played after learning it in parts. However, I used this strategy in conjunction with others, such as P.5.A.1 and P.5.A.2, to guide the child to play the accurate notes.

Table 73. Scenario 3

Researcher's action:	I used strategy P.5.A.4 to teach the child 'Minuet in G' and 'Ode to Joy'.
Child's reaction:	Child 14 engaged throughout the task and took turns with me.
Analysis:	This strategy was particularly useful for Child 14, who does not have absolute pitch and struggled to remember the piece. By alternating turns and learning the piece in parts, the child gradually learned the materials. Moreover, he would become upset whenever he played the materials incorrectly, by breaking down the materials into smaller sections, he could remember the materials and played them correctly thus developed the confidence in learning a new instrument. This corresponds to Evans' (2017) motivational theory on the beliefssx of children and adults regarding the nature of their abilities in any domain, which guide their thinking and behaviour. We could see such behaviour in Child 14 when he felt frustrated and upset when he got the materials wrong. To motivate and encourage him, I divided the materials into short sections that he was capable of gradually learning and remembering. He demonstrated a high percentage of engagement when I implemented this strategy, which suggests that it was effective. Evidently, the slight disengagement during some of the sessions was due to Child 14

	losing concentration on the task and randomly initiating conversation at times.
Researcher's thought process and action:	This strategy was effective in gradually teaching pieces to Child 14, who has a short memory span and no absolute pitch, through the assignment of short sections as well as taking turns with me. However, I did not use this strategy on its own but in fact combined it with P.5.A.1, P.5.A.2 and P.5.A.3 to support the child in accurately learning the materials.

In summary, by employing suitable strategies, I taught the children short and simple pieces on the piano despite their lack of prior knowledge of the instrument. All of the strategies above proved effective, as all three children successfully performed a short piece without my support after several sessions. In these cases, I modified and adapted the strategies according to the respective child's learning needs.

7.3.4 Proactive: Element B

According to Harwood and Marsh (2018), the ability to improvise or extend the model represents another form of musicianship that exceeds the ability to decode or encode music in traditional notation. Once children have obtained the skills to perform an entire piece, they can learn to vary the original materials in various ways, such as improvising familiar materials or transposing original materials into other keys. With this element, children realise that they can vary materials. Subsequently, they can learn about creativity and using their imagination to explore ways to alter the original materials. A core impairments of ASC is the deficit in joint attention, which obstructs social play and imagination. However, through artistic means, such as music, drama and art, teachers may be able to develop creativity and imagination among children with ASC.

Strategy 1 (P.5.B.1)

The teacher supports the child in improvising previously learned pieces. The teacher first introduces such improvisation through a demonstration before the child imitates the teacher in return. Once the child grasps the concept of improvisation, the teacher permits the child to improvise independently.

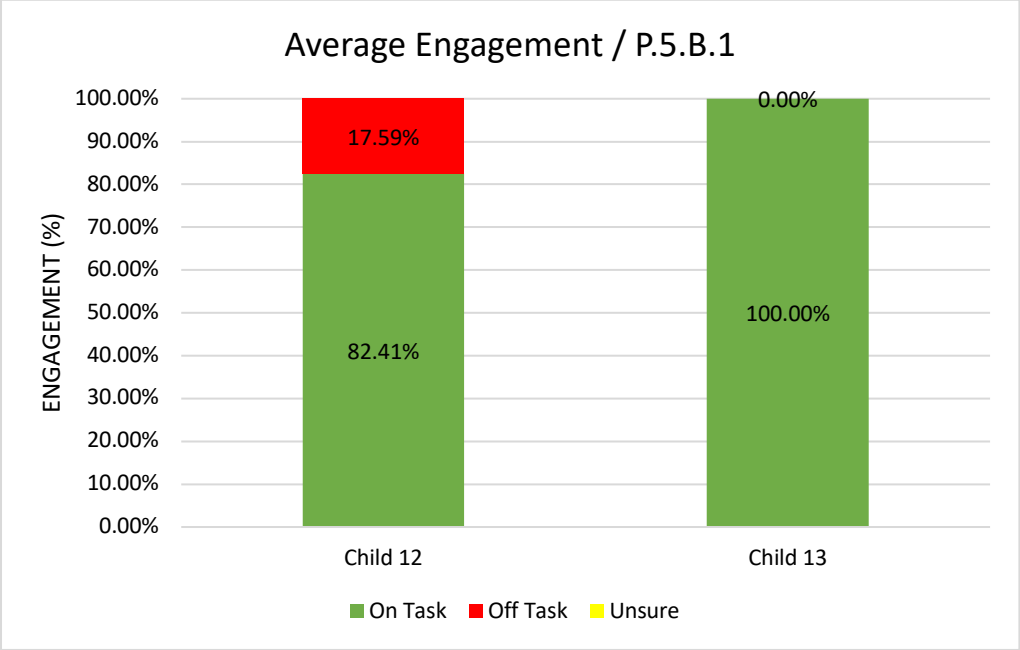


Figure 51. Average engagement of Child 12 and Child 13

Figure 51 indicates that I implemented this strategy only with Children 12 and 13, as Child 14 had not yet mastered a full piece and needed additional time to establish basic skills before proceeding to improvisation (Ockelford, 2013). Students can move to a higher level of musicality only once they have accomplished all of the skills that precede it. In addition, I introduced the strategy only once or twice in all of the sessions, as I wanted to be certain that the child was comfortable improvising known pieces. The two scenarios below derive from Children 12 and 13.

Table 74. Scenario 1

Researcher's decision and action:	I acknowledged that Child 12 had mastered 'Twinkle, Twinkle, Little Star' and decided to introduce improvisation into the

	song. I demonstrated the improvised material for the child to copy.
Child's reaction:	The child watched attentively as I played. He then started to improvise by himself. When he struggled to play the melody, I supported him with a second demonstration of the material. After several attempts, the child was able to play the whole improvised version with minimal support from me.
Analysis:	Child 12 registered a high percentage of engagement. Although he engaged in the task and imitated my playing, he scored 17% disengagement when I requested that he replay the improvised material once he was successful. The child started to play the first half of the song but then stopped and refused to continue. It is possible that improvisation was new to the child, so he found it difficult to master. Alternatively, the child may have been uninterested in improvising the material.
Researcher's thought process and action:	In this scenario, I encouraged the child to try again; however, when this failed, I moved to another activity, such as playing a new piece for the child or instructing the child to perform a previously learned piece. To teach the child the new improvised materials, I combined the strategy with P.5.A.1 or P.5.A.2 for extra support.

Table 75. Scenario 2

Researcher's decision and action:	Child 13 was highly motivated in music activities. He learned all of the pieces that I introduced and performed them. I then introduced the improvisation skill to the child and demonstrated the improvised material for the child to copy.

Child's reaction:	The child watched attentively throughout the demonstration and accurately imitated the materials. When he struggled to remember them, he pulled my hand to the piano so that I could demonstrate.
Analysis:	The child exhibited full engagement in the task. Thus, motivation and interest in an activity drive the eagerness of a child to learn. Gagné (2010) described such elements as 'intrapersonal catalysts' through which achievements motivate talented children to seek self-improvement or learn new skills. Gagné observed that some gifted children displayed personalities that differ from those of other children. Specifically, they may be over-excitable in their psychomotor, intellectual, sensual, imaginational and emotional areas of development. Such over-excitability can manifest in many diverse ways as well as in music, and it could explain a child's love for a particular genre or composer or the child's commitment to learning a particular instrument (Coleman & Cross, 2000). For example, Child 13 was eager to learn every song that I introduced.
Researcher's thought process and action:	Child 13 expressed a keen interest in learning the instrument and materials, so I continued with the strategy and introduced additional materials. This practice can subsequently support the child in learning to compose his own composition.

Strategy 2 (P.5.B.2)

The teacher introduces transposition to existing materials.

Depending on the child's ability and interest, this strategy may have been introduced

before strategy P.5.B.1. I discovered that children found it easier to grasp the concept of transposition compared to that of improvisation. With this strategy, I used imitation to teach the children to transpose pieces into various keys. The aural process for learning the song occurred over several lessons and was successful for most students; however, a natural by-product of this informal learning approach was the discovery of musical concepts, such as instrumental transposition, about which the students became curious.

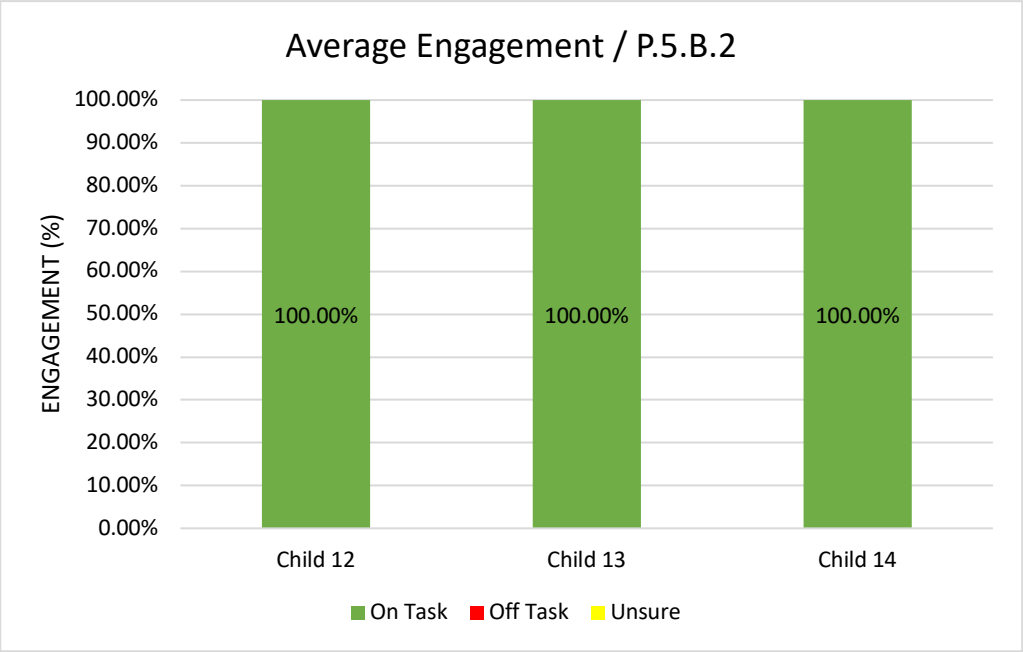


Figure 52. Average engagement of Child 12, Child 13 and Child 14

All three children registered 100% engagement in the task, which suggests that the strategy was effective in engaging them in learning to transpose previously learned pieces into various keys. The strategy was not implemented in all sessions, as I applied it depending on each child's learning progress. Only once children have mastered the full piece can they then learn to vary the materials.

Table 76. Scenario 1

Researcher's decision and action:	Once the child had mastered a simple song, such as 'Twinkle, Twinkle, Little Star', I introduced transposition of the material into various keys. I chose 'Twinkle, Twinkle, Little Star' for its simplicity and repetition, which render it suitable for children who are starting to learn improvisation or transposition.
Children's reactions:	With absolute pitch, Children 12 and 13 easily imitated me in transposing the materials into other keys. However, there were occasions on which both children needed additional guidance through visual cues or physical support, for example, to play the right notes. Child 14 also required support, such as visual cues, to play accurately.
Analysis:	The strategy was successful in teaching transposition to the children. My use of known material ensured their familiarity with the melody, which allowed them to focus on transposing the melody into other keys. The success of the strategy illustrates that, without prior knowledge of the instrument or a long period of exposure to learning it, it is still possible to learn transposition or improvisational skills. In session 2, Child 12 was already able to learn the transposition of 'Twinkle, Twinkle, Little Star' into various keys. Thus, this skill can be developed with appropriate scaffolding. As Gagné discussed, environmental catalysts are as important as intrapersonal catalysts in motivating children. These environmental catalysts include the individual influence of teachers, parents and peers. In this scenario, the child developed this skill through my influence and proper scaffolding.

Researcher's thought process and action:	The success of the strategy is apparent from the figure above; however, I did not always use the strategy on its own. At times, I combined it with P.5.A.1 and P.5.A.2 to provide additional support in learning to transpose the melody into various keys. While implementing the strategy, I had to consider each child's learning modalities and alter the strategy accordingly.

In summary, both strategies were effective in teaching improvisation and transposition skills to children at Level 5. I used the strategy in conjunction with other strategies, such as P.5.A.1 (hand-under-hand), to reinforce the learning.

7.3.5 Proactive: Element D

Playing the piano requires simultaneous utilisation of several brain functions, as it involves memorisation, recognition and physical execution of sounds through the sensory integration of input from proprioception, vision and hearing. Often, specific piano techniques must be developed to achieve certain musical aims as well as to acquire the physical capacity and ability to play increasingly complex and lengthy material. Once the children had mastered simple pieces of potentially growing complexity and length, I introduced simple piano techniques, such as coordination of playing with both hands or playing scales with adopted fingerings, to overcome the technical challenges of more advanced pieces. However, for children with ASC, matters of technique may present a particular challenge in view of their physical disabilities. Therefore, the development of technique is important, but modification of technique should be considered to meet each child's physical needs.

Strategy 1 (P.5.D.1)

With this strategy, the teacher introduces a variety of piano techniques. The teacher supports the child in playing pieces with both hands and introduces scales and

technical exercises to improve piano techniques. The teacher uses demonstration rather than explanation since some children with ASC have difficulty with comprehending complex musical concepts and instructions.

Through demonstration, the children could see, feel and listen to the music. This strategy can be used in conjunction with P.5.A.1, P.5.A.2 or P.5.A.3 – respectively, the hand-under-hand technique so that the child can feel the movement, visual prompts through which the child can visualise the correct keys to play and visual labels by which the child can visualise and match the correct letter notations to the correct keys on the piano – or with a combination of all three. In this project, I had to adapt and modify my strategy to suit each child's learning needs.

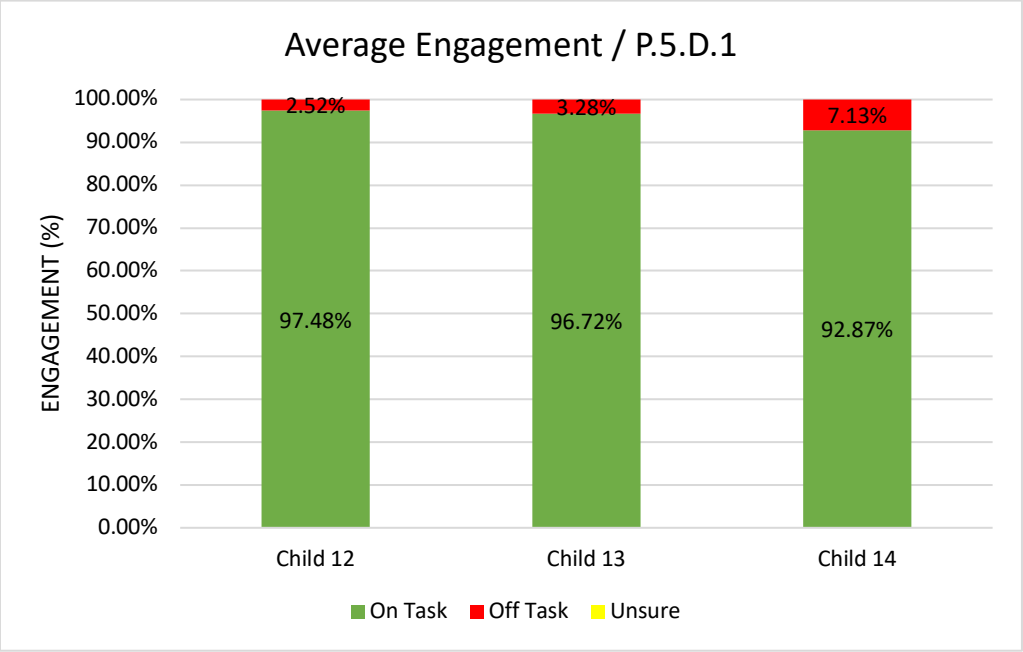


Figure 53. Average engagement of Child 12, Child 13 and Child 14

Figure 53 indicates a high percentage of engagement for all children when I implemented this strategy. The scores suggest that the strategy was effective in teaching the children piano techniques for playing more complex and advanced pieces. The tables below contain the three scenarios for the children.

Table 77. Scenario 1

Researcher's decision and action:	When Child 12 learned to play a piece, he could imitate the keys accurately but could not apply the correct fingerings or techniques. I noticed that the child played the pieces mainly with the second, third and fourth fingers and rarely used the first or fifth fingers. To impart good technique, I implemented this strategy through a demonstration for Child 12 wherein I used every finger to play the piano. This strategy was used in combination with strategy P.5.A.1; accordingly, I held the child's hand to direct him to the correct fingering.
Child's reaction:	Child 12 managed to play when I supported him by holding his hands; however, when he started to play by himself, he returned to his previous habit of playing with his own preferred fingerings. In some of the sessions, the child could not tolerate me holding his hand to correct the fingerings.
Analysis:	According to Ockelford (2013), technique development among children with ASC is likely to require many hours of painstaking work. From these observations, it is clear that the child managed to play with support, which suggests that the strategy can convey and teach good techniques. However, children might need additional time and sessions of repeated practice to remember and become comfortable and familiar with new techniques. Some children with ASC cannot tolerate the sensation of touch for a long period of time; this was evident with Child 12, who disengaged from the task in some sessions and played the material in his own way.

Researcher's thought process and action:	In this scenario, I modified the technique to suit the child's learning needs, such as by changing some fingerings in technical exercises to familiarise the child with playing with all fingers. I then gradually applied this approach to the pieces that he was learning, or I used only demonstration so that the child could imitate me without feeling the pressure of me holding his hand. I understand that such a task can be difficult for the child and require hours of practice to achieve technical skill.

Table 78. Scenario 2

Researcher's action:	I implemented strategy P.5.D.1 in conjunction with P.5.A.1 to teach Child 13 to play pieces with accurate fingerings. This implementation pursued certain musical aims, such as smoothly joining a phrase.
Child's reaction:	Child 13 was highly motivated to learn the piano and exhibited interest in accurately playing the piece. I started implementing this strategy in conjunction with P.5.A.1 to illustrate adequate fingerings, and the child subsequently pulled my hand whenever he struggled to play accurately.
Analysis:	With an intrapersonal catalyst, Child 13 was motivated to learn pieces on the piano while simultaneously advancing his techniques. Self-motivation and interest were key to the child's learning and evidence that children with ASC can learn piano techniques when they receive appropriate guidance.
Researcher's thought process and action:	I continued to use this strategy in conjunction with strategy P.5.A.1 to teach the child proper piano techniques to play more advanced pieces.

Table 79. Scenario 3

Researcher's decision and action:	I noticed that Child 14 liked to play with only one finger, namely his index finger. He played the piano as if typing on a computer, thus matching the letter notation to the correct keys. I decided to implement this strategy by first introducing technical exercises, such as playing simple five-finger scales, to clarify how to use all fingers to play the piano. I also used simple verbal instructions, such as 'use finger 1' or simply naming the finger numbers, to allow the child to follow along and play with good technique.
Child's reaction:	Child 14 engaged in the task on most occasions, although he found it difficult to play pieces with all of his fingers. However, he was able to tolerate the input when I held his hand to support him.
Analysis:	In this scenario, the child had difficulty with the execution and with coordinating individual fingers to play. He had not yet developed an understanding of using his fingers to play the piano. This hindrance may have been due to his physical capability or a need for more time to develop finger coordination. Unlike Child 13, who sought guidance for improvement, Child 14 refused my support at times and became disengaged from the task.
Researcher's thought process and action:	For cases like that of Child 14, I must be sensitive in providing support and help. When the child occasionally refused support, I modified the strategy to guide the child with simple verbal instructions, such as stating the finger numbers, instead of holding the child's hand. I also recognised that the child may have needed several hours to develop the technical skills;

	therefore, I continued to implement the strategy in every session with the child.

In summary, hours of practice are necessary to develop technical piano skills. For children with ASC, who may have a physical disability that prevents them from playing the pieces with conventional fingerings, teachers should modify the technique to assist the child in overcoming such challenges.

7.3.6 Interactive: Element A

Music making is a social process which often involves multiple people. Although listening to music and playing an instrument can be undertaken alone, music collaboration offers a unique framework through which people can experience and develop many skills and disciplines of social interaction. Ensemble skills are important in music making and essential for a musician to play in time and in tune with other musicians. With this element, the child learns ensemble skills by performing or playing simultaneously with others, such as teachers or peers.

Strategy 1 (I.5.A.1)

The instructor teaches ensemble skills to the child by playing together with the child or having the child play simultaneously with others . This strategy can be used in conjunction with other strategies, such as P.5.A.1 or P.5.A.2, to support the child in playing accurately and in time with others.

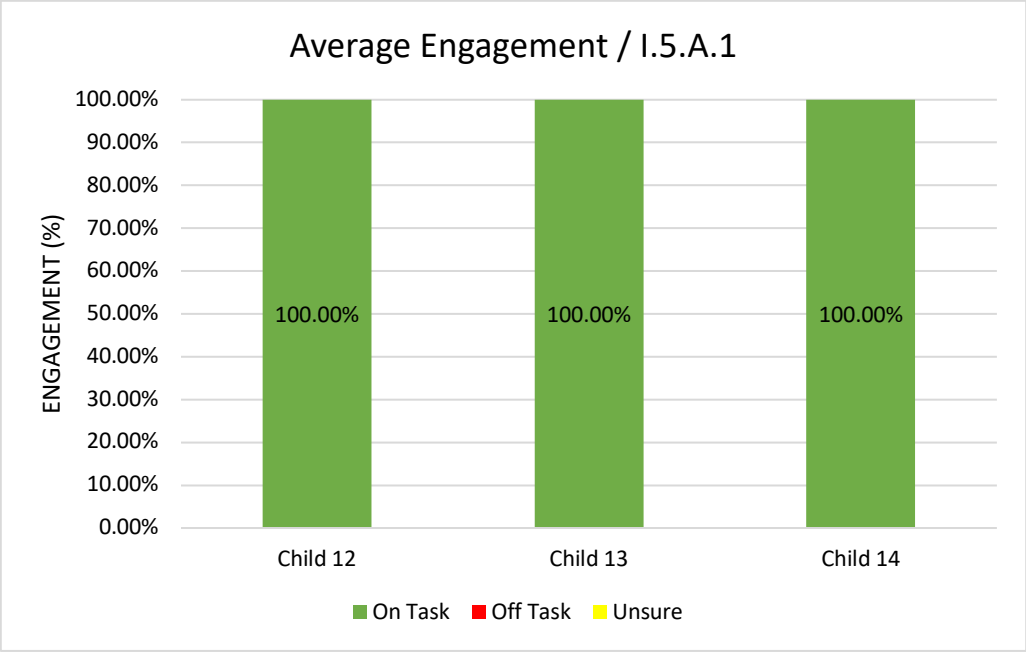


Figure 54. Average engagement of Child 12, Child 13 and Child 14

Figure 54 indicates that all children played simultaneously with me by sharing a common part. Joint attention was important for this task, as it necessitates that the teacher and child are attuned with each other in sharing a common activity.

Table 80. Scenario 1

Researcher's decision and action:	Once the child had mastered the material, I introduced ensemble skills by first playing a common part with the child. I used pieces that the child had learned previously, including 'Minuet in G', 'Ode to Joy', 'Fur Elise' and 'Twinkle, Twinkle, Little Star'.
Child's reaction:	The children were able to play simultaneously with me by sharing a common part.
Analysis:	A deficit in joint attention is a core impairment of children with ASC. However, the Level 5 children were able to engage in shared activity with others. Moreover, they all maintained their own playing while playing together with me. Therefore, activities such as music making and learning an instrument can develop

	joint attention skills. With such skills, children with ASC, who often struggle with social interaction, can develop skills for interacting with others when verbal interaction is impossible. Through music, children can engage in 'proto conversations', or meaningful exchanges that transmit a message that both parties understand without involving elaborate signage. Playing the piano with others can also contribute to 'developing cognisance of a sentient with the "other" out there' (Ockelford, 2013).
Researcher's thought process and action:	Once the children could simultaneously play a common part with me, I allowed them to maintain an independent part while I played the accompaniment (see I.5.B.1). Thereby, I scaffolded the children to play an independent part within an ensemble.

7.3.7 Interactive: Element B

Once the children accomplished the skill of playing simultaneously with others by sharing a common part, I introduced them to playing with others while maintaining their own independent part. This practice advanced the ensemble skills of the children, as they were able to focus on their own playing while also playing in time and in tune with others.

Strategy 1 (I.5.B.1)

The teacher provides accompaniment or similar support as the child plays the melody, or the teacher plays the second part of a duet with the child. With this strategy, children can develop ensemble skills and learn to perform with others.

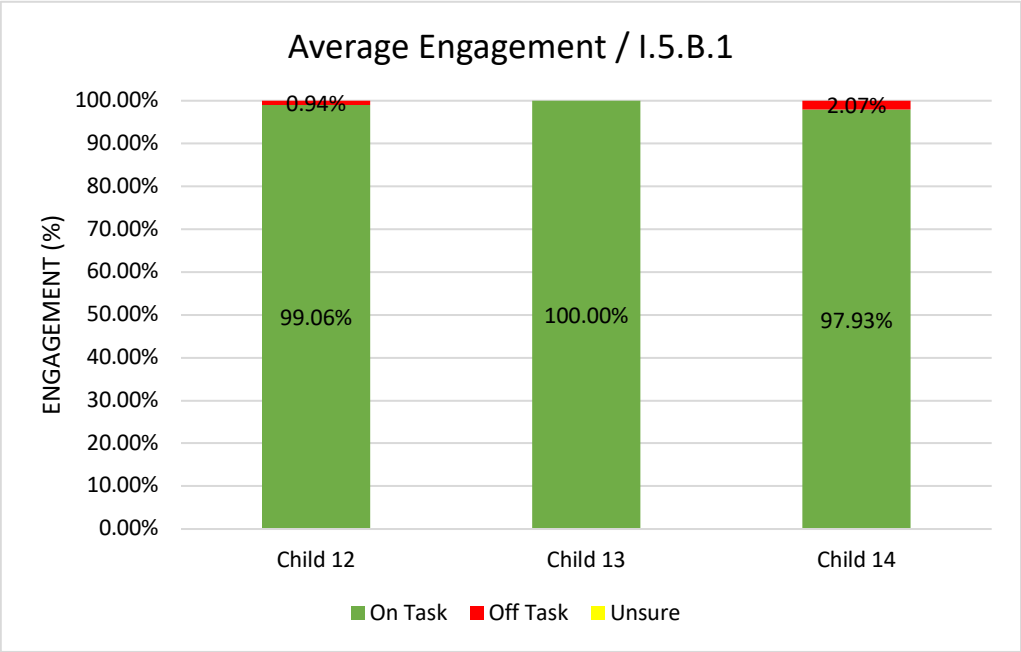


Figure 55. Average engagement of Child 12, Child 13 and Child 14

Figure 55 indicates that the engagement of all children was high. A comparison of the above figures with those of strategy I.5.A.1 highlights some disengagement from the task during the implementation of I.5.B.1. This evidence suggests that playing simultaneously with others and maintaining an independent part requires more advanced concentration and cognitive skills.

Table 81. Scenario 1

Researcher's decision and action:	As the child had mastered playing the full piece, their next step was to perform the piece simultaneously with me while maintaining an independent part. I used the strategy to introduce basic ensemble skills, which require the child to collaborate with others to make music.
Child's reaction:	All three children engaged in the task and played simultaneously with me while maintaining their own independent part.
Analysis:	The children each maintained a high percentage of engagement in all sessions. As DeNora (2000) and Turino (2008) stated, making music is a social process, and individuals learn through engaging in musical experiences with others. For example, they may perform in a group or listen to others. The underlying thought is founded on socio-constructivist learning theories (Vygotsky, 1978; Brooks & Brooks, 2001) for music learning, including a collaborative learning experience in which students learn from one another. Collaborative learning provides opportunities for peer and teacher mediation, wherein both peers and the teacher have central roles in knowledge construction. In contrast, with traditional teacher-led learning, the teacher has the dominant role in scaffolding the student. In this project, the children only played together with me, as the children were still at an early developmental stage with regard to ensemble skills. Therefore, I provided appropriate scaffolding to prepare the children for future ensemble opportunities.

Researcher's thought process and action:	Children at Level 5 are capable of learning ensemble skills and playing simultaneously with others. According to Ockelford (2013), children with ASC are generally able to perform with others, although the ability is dependent on their musical, cognition and social development levels. Some children may even exhibit varying degrees of sensitivity to the fluctuating dynamics but be able to conceptualise and assume distinct roles. However, the primary challenges are working together and making decisions while using little or no language as well as the difficulty of comprehending musical instructions. In this case, it was optimal for me first to scaffold the child by playing together with the child to impart appropriate skills, such as the ability to play in time with others and maintain an independent part without disruption from the simultaneous parts of others, as well as sensitive listening and cooperation skills. In this scenario, I first assumed the dominant role of leading the child while playing together before gradually transferring control to the child.

7.3.8 Interactive: Element C

Once children have developed improvisation and ensemble skills, they can combine them to enjoy creative music making in a group, wherein one player improvises together with other players.

Strategy 1 (I.5.C.1)

The teacher introduces improvised materials with adequate support, such as by demonstration or use of the hand-under-hand or hand-over-hand technique while playing with the child at the same time. Notably, if the child possesses absolute pitch,

the teacher can guide him or her by singing the improvised materials and subsequently playing them on the piano. The teacher can then encourage the child to further develop materials through independent improvisation.

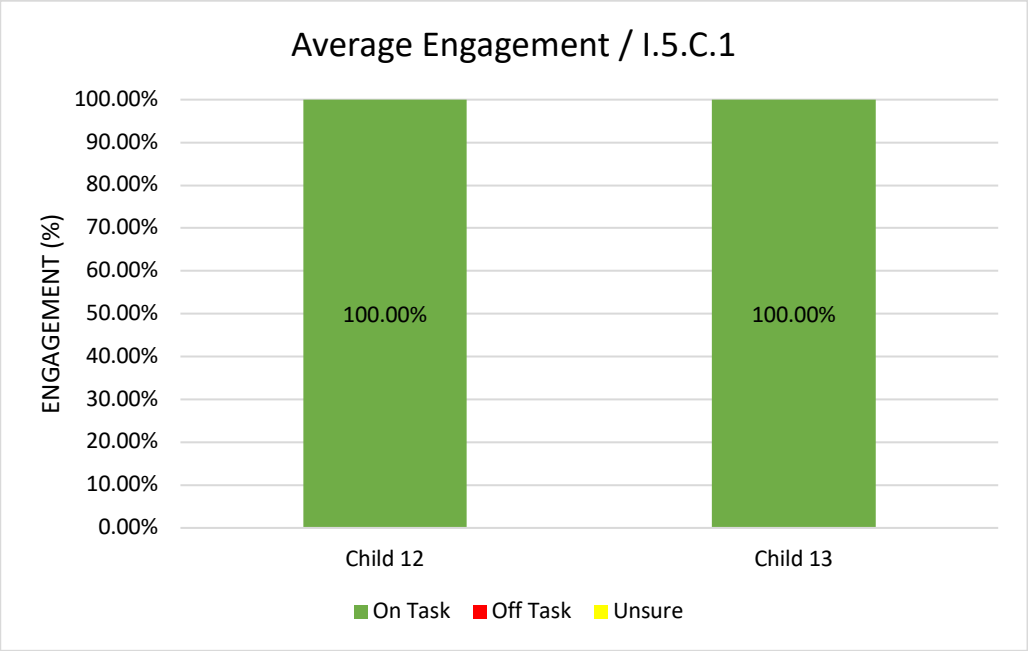


Figure 56. Average engagement of Child 12 and Child 13

Figure 56 indicates I implemented the strategy with only two children, as I applied it based on a sequential approach and the capability of the child. Child 14 was still learning to play pieces accurately and developing ensemble skills; therefore, he was not ready to learn to simultaneously improvise and play together with others. The ability to improvise or extend materials is another form of musicianship which extends the ability to decode and encode the music (Harshwood & Marsh, 2018). It also requires advanced cognitive ability to perform two skills at once. Child 14 may have required more time than Child 12 and Child 13 needed to acquire the skill. For Child 12 and Child 13, I implemented the strategy in only one session, because the lessons were mainly child-centred and the children have only shown interest in improvising on the materials in one session and therefore, I have only played simultaneously with them once in that session. Although I prepared a series of potential strategies in

advance, I had to proceed according to whether the child reacted differently or preferred to participate in another task. The two scenarios derive from Children 12 and 13.

Table 82. Scenario 1

Child's action:	While learning 'Sonata in A' by Mozart, Child 12 started to improvise the opening theme instead of imitating the actual material.
Researcher's reaction:	This was the first time that Child 12 started to improvise on his own. To encourage and motivate the child, I decided to join in by providing harmonies as the child improvised.
Analysis:	To support and encourage the improvisation, I decided to stop the task of teaching the actual piece and instead provide harmonies and improvise alongside the child. By providing appropriate support, such as playing simultaneously with the child, I could teach the child to play in time with others. According to Ockelford (2013), denying a child his or her principal source of pleasure and achievement is abusive; therefore, instead of stopping the child, I decided to him, which allowed his creativity to flourish and for him to enjoy making music with others.
Researcher's thought process and action:	I created harmonies for the child to implicitly guide him in improvisation. As a new skill for the child, it was important for me to provide guidance so that he could develop improvisation and ensemble skills. In this scenario, I discontinued the previous strategy and adapted to the child, who enjoyed every minute of the session. Thus, it is

	imperative that teachers constantly observe children's actions, be flexible in changing the strategy and permit the child to lead the session when necessary.

Table 83. Scenario 2

Child's action:	While learning 'Ode to Joy', Child 13 started to improvise with the notes C and G halfway through the session,
Researcher's reaction:	It is unknown why the child chose C and G, but the piece is written in the key of C, which may have led the child to choose the two notes, which are tonic and dominant. I decided to join in with the child and thereby transformed the activity into a small improvisational task.
Analysis:	This scenario was similar to those in which the child spontaneously initiated improvisation. Instead of continuing to teach the child the actual piece, I decided join the child by providing harmonies and improvising with the child at the same time. After enjoying the improvision and playing simultaneously with me, the child stopped and reengaged in the previous task of learning the piece of music.
Researcher's thought process and action:	This scenario highlights the importance of encouraging children to make music. Moreover, it emphasises that music making should be fun for children. The music psychologist David Hargreaves (1986) once identified play as a vital part of children's lives and reported that they learn most effectively when they are having fun. Notably, forms of play promote different types of learning; for instance, in this scenario, the child enjoyed improvising his own material, and

	he learned to improvise and play simultaneously with me. Therefore, scaffolding in early musical development is crucial, and the teacher has to be observant and flexible to adapt strategies to suit each child's learning needs. Stimulating children's musical imagination can increase their enthusiasm about exploring new and exciting musical territories.

In summary, the strategies above were effective in teaching ensemble skills to children. Children with ASC can perform simultaneously with others, but appropriate scaffolding is necessary at first to assist the child in developing the appropriate skills.

7.4 Musical Development of the Children in SoI framework

The progress of the musical development of all three children was mapped according to the SoI framework. The underlying assumption is that effective strategies promote an increase in the musical development of the child. The three graphs below present the results.

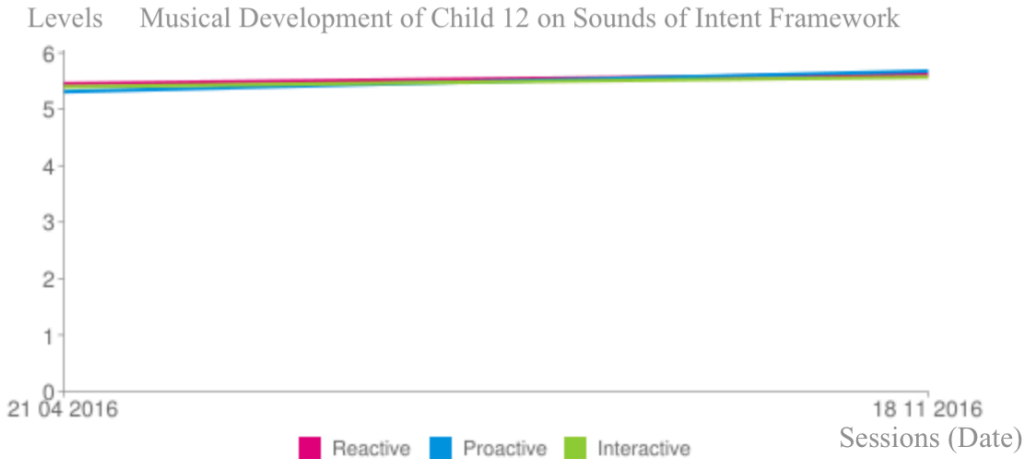


Figure 57. Progress of musical development of Child 12 over the course of sessions

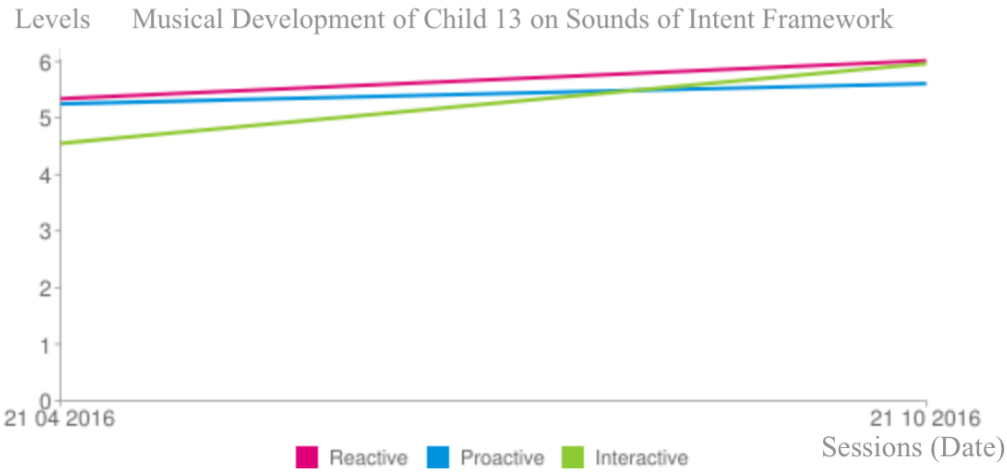


Figure 58. Progress of musical development of Child 13 over the course of sessions

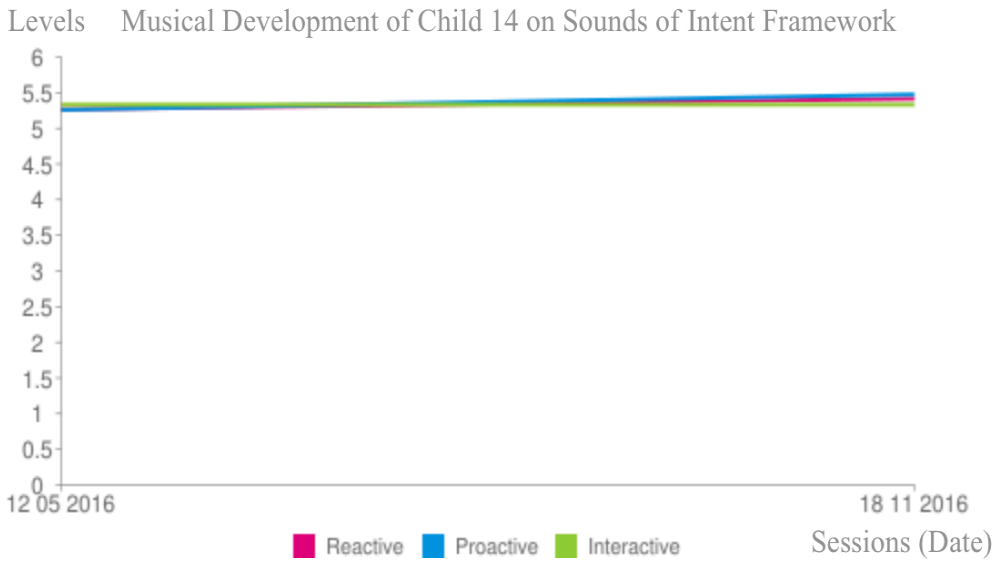


Figure 59. Progress of musical development of Child 14 over the course of sessions

Over the course of the sessions, all three children evidenced a noticeable upward trend in musical engagement. However, Child 14's musical process was slower than that of Children 12 and 13, possibly because Child 14 needed more time to improve his musical skills. His interactive domain was also stagnant, which suggests that he had yet to develop ensemble skills. The interactive domain of Child 13 increased substantially compared to his proactive and reactive domains, which supports the use of the piano, which can illustrate the cause and effect relationship in musical development, to promote engagement. In working with the children on a one-to-one basis, shared attention is a significant notion. By concentrating on the processes of imitation and alternating turns, the attention of the child and I became attuned with each other, which led to attention feedback within the space around the instrument. However, other factors may have affected the results, including the following:

1. The children's growing familiarity with the materials, routine of the sessions and instructor, which may have enabled them to engage and musically interact more fully over time

2. My deepening knowledge of the children, which allowed me to scaffold the children's interactions more effectively as the sessions progressed

7.5 Discussion and reflection

The overall results suggest that the strategies were effective in promoting musical skills among children with ASC who have severe learning difficulties, as the participants demonstrated progress in their musical development according to the SoI framework. The hypothesis of the project is that effective strategies promote the musical development of children. Although the three children developed at different rates, they all evidenced increases in the three domains. This finding suggests that interest in learning an instrument can be a significant motivation for children. Eccles (2005) introduced this concept of intrinsic interest value in his expectancy-value theory of achievement motivation, which explains the values that individuals attach to various choices. This concept emerged in Child 13, who developed an immense fondness for playing the piano, as apparent from his constantly high engagement in all tasks during the sessions. Although Child 13 had yet to develop a preference for genres, he was strongly interested in playing the piano and consequently learned all of the pieces that I provided to him. Meanwhile, Children 12 and 14 expressed strong musical preferences, which drove them to engage in the task for a long period of time when playing such pieces. This finding concurs with a study by Hillier et al. (2016), who found that participants with ASC were more physiologically responsive to their preferred music.

From the evidence I gathered, I discovered that some of the children at Level 5, namely Children 12 and 13, possessed behavioural traits that resemble those of musical savants. The piano is a suitable instrument for such children to embark on their musical

journey because its design provides immediacy and consistency of sound. This perception of absoluteness drives them towards the instrument. The results of the study corroborate these ideas by revealing that all three children, who lacked prior knowledge of the instrument, learned to play short pieces on the piano when they received appropriate support. In this context, piano techniques are not the priority; rather, music making is the main focus. The children learned to make music before learning the techniques in order to first develop the physical capacity and ability to evolve to meet the needs of increasingly complex and lengthy materials.

Unlike traditional piano pedagogies, which depend heavily on a single modality (see Chapter 2), multimodal forms of music acquisition are well suited to children with ASC who have learning difficulties. The results demonstrate that Children 12 and 13, who have absolute pitch and advanced memory skills, were able to learn through imitation (i.e. visual and auditory modalities), and the accuracy of the playing was further reinforced by the hand-under-hand technique or my holding their hand to correct their playing (i.e. the kinaesthetic modality). At the end of the sessions, Children 12 and 13 were able to play at least three short pieces from memory without my support. Appropriate scaffolding enabled the musical potential of these children. Much of the literature on talent development has discussed the influence of significant individuals, such as parents, teachers and peers, in providing the necessary emotional and intellectual support to develop skills at the highest level (McPherson, 2009; McPherson, Davidson & Faulkner, 2012). Therefore, it was critical to scaffold the participants to maximise their potential. As Gagné (2010) stated, no amount of giftedness guarantees success without opportunities for intense systematic learning and practice.

Child 14, who has a rather short memory and does not have absolute pitch, was also

able to learn through imitation (i.e. visual and auditory modalities) but constantly required additional support. With the appropriate scaffolding, he was able to perform two short pieces by the end of the session with minimal support. These results suggest that children with ASC who have learning difficulties could learn to play the instrument when the received proper scaffolding. Furthermore, multimodal learning is seemingly an effective strategy to teach the piano to children with ASC who have learning difficulties.

Although the children benefitted from systematic and sustained educational input, it was crucial for me to modify and adopt an evolutionary (rather than radical) approach to guide each child in exploring all of the musical possibilities. Piano strategies that I developed based on the unique learning modalities of the children were effective in teaching the materials; however, the strategies that I adopted during the sessions were founded predominantly on my thought process and decision making in the moment. These strategies directly influenced the children's engagement in their learning process. Therefore, when implementing strategies to teach this population, it is important to observe the reactions of the children before deciding on strategies to implement. If a child reacts positively to a strategy, the teacher should continue to use it; if met with a poor reaction, the teacher should modify or synthesise different strategies to tailor the instruction to the child's learning needs.

7.5.1 Summary of Musical Profile of Children 12, 13 and 14

Table 84 shows a summary of the children's engagement on all strategies. The results reveal that all three children has high engagement on all the strategies which suggests that the strategy were effective in assisting the child in learning the piano.

Table 84. Summary of engagement of children 12, 13 and 14

Level 5													
Domains	Reactive		Proactive							Interactive			
Strategies (Modalities)	R.5.A.1 (A)	R.5.B.1 (A)	P.5.A.1 (K.A)	P.5.A.2 (V.A)	P.5.A.3 (V)	P.5.A.4 (V.A)	P.5.B.1 (V.K.A)	P.5.B.2 (V.K.A)	P.5.D.1 (V.K.A)	I.5.A.1 (V.A)	I.5.B.1 (V.A)	I.5.C.1 (V.A)	Combination of Strategies
Child 12	●	●	●	●	-	●	●	●	●	●	●	●	Y
Success	Y	Y	Y				Y		Y	Y	Y	Y	
Child 13	●	●	●	●	-	●	●	●	●	●	●	●	Y
Success	Y	Y	Y				Y		Y	Y	Y	Y	
Child 14	●	●	●	●	●	●	-	●	●	●	●	-	Y
Success	Y	Y	Y				Y		Y	Y	Y		

Notes: A=Auditory modality, K=Kinaesthetic modality, V= Visual modality, Y=Yes (use of combination of strategies, ● Engagement 70-100%, ● Engagement 40-69%, ● Engagement 0-39%, box with (-) =did not use the strategy, Success(met success criteria on the piano framework)=Y and N=did not meet the success criteria

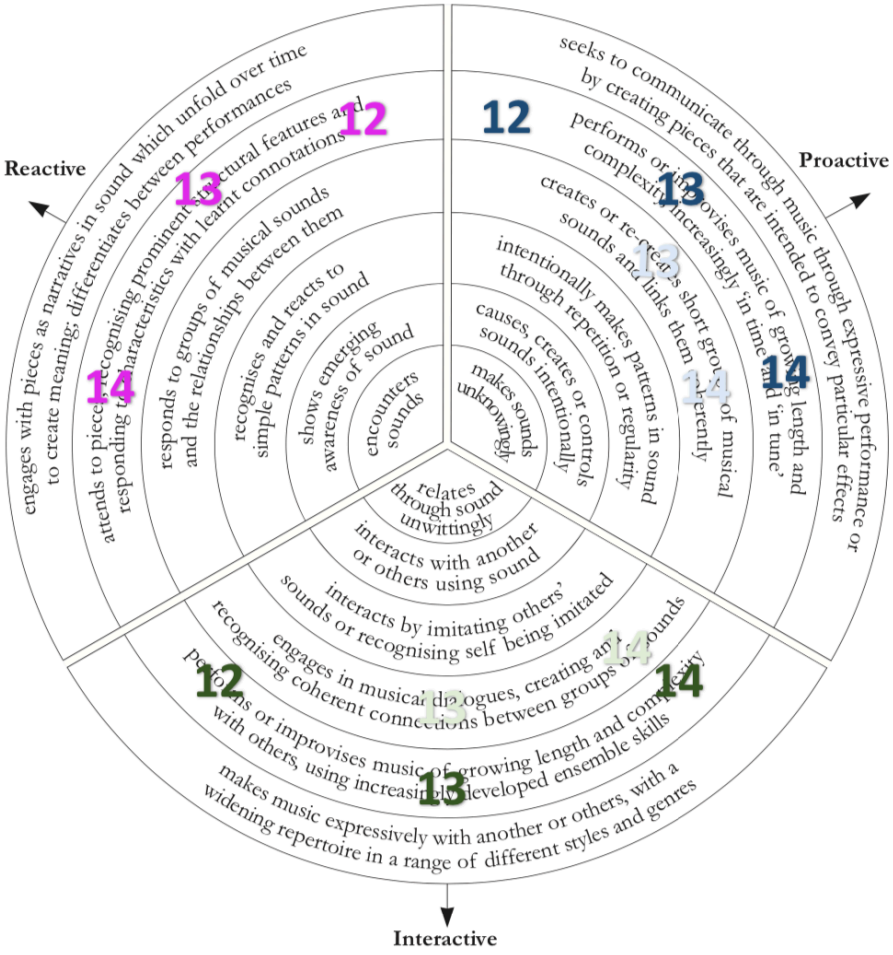


Figure 60. Concentric profile of Children 12, 13 and 14

Figure 60 demonstrates the concentric profile of all children. Although the children seemingly remained at the same level throughout the study, I observed vast progress in the piano pedagogical context. Children 12, 13 and 14 were assessed at Level 5 of the Sounds of Intent framework by their music teacher despite possessing no prior knowledge of the mechanism of the piano at the start of the study – in other words, they learned the instrument 'from scratch'. Children 13 and 14 evidenced some musical behaviours at Level 4 (i.e. imitating short musical motifs) when they first began, but they rapidly progressed towards Level 5. Based on the expanded SoI framework in Table 3, the children at Level 5 moved through the elements within the

level. They progressed from having no understanding of how to play the piano to successfully playing at least three simple pieces without my support (proactive element A) to, finally, improvising on a simple piece that they had learned (proactive element B).

In addition, all three children could play with some good techniques and coordinate to play with two hands at the same time. At the start of the study, Child 13 was experiencing difficulties in playing simultaneously with me. Specifically, he seemed to have trouble integrating the information, and he would stop and restart the material again when he heard me play at the same time. However, this condition improved over the sessions, and he began to successfully play simultaneously with me - first by sharing a common part (interactive element A) and subsequently by playing his own independent part while I simultaneously played the accompaniment (interactive element B). Child 12 and Child 14 exhibited the same improvement as well. These outcomes reveal the progress of the children over the course of the study despite remaining at Level 5. A stack profile of each child is also presented in Table 85.

Profile of Child 12					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	0	P3	0	I3	0
R4	0	P4	0	I4	0
R5	100	P5	100	I5	100
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 13					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	0	P3	0	I3	0
R4	0	P4	8	I4	16
R5	100	P5	92	I5	84
R6	0	P6	0	I6	0
	100		100		100

Profile of Child 14					
Domain	%	Domain	%	Domain	%
R1	0	P1	0	I1	0
R2	0	P2	0	I2	0
R3	0	P3	0	I3	0
R4	0	P4	14	I4	17
R5	100	P5	86	I5	83
R6	0	P6	0	I6	0
	100		100		100

Table 85. Stack profile of Child 12, 13 and 14 over the course of the sessions

7.6 Conclusion

Chapter 7 has conducted a detailed analysis of the sessions of children at Level 5. The main findings reveal that the strategies implemented were effective in teaching the piano to these children. The findings also indicate that the Children 12 and 13 exhibited musical behavioural traits, such as absolute pitch and advanced memory skills, which are similar to those of musical savants. For children who possess absolute pitch, the findings highlight that the preferred learning style was imitation. Participants registered high engagement with almost all strategies, which suggests that such strategies can manifest talent in musical performance among these children.

Chapter 8. Discussion and Conclusions

8.1 Introduction

This chapter synthesises the results of the entire research project and contextualises the findings in relation to the literature. It also reconsiders the aims of the study and reviews and addresses the research question. The chapter concludes with a discussion of the study's limitations as well as directions for future research.

8.2 The main findings of the research

8.2.1 Research question 1: Can the piano be used as a medium to promote musical skill when engaging with children with ASC who have learning difficulties?

This study used my own pedagogical approaches to explore the research question. For children at Levels 2 and 3 of SoI and in the early stages of musical development, the results illustrate that the piano is more suitable as a multisensory tool than as a traditional musical instrument in promoting musical skills. The versatility of the piano is a useful resource for engaging children in a number of proto-musical activities as well as teaching them the concept of cause and effect. The piano can demonstrate cause and effect in the early stages of musical development through its consistency: pressing a key always causes it to generate the same effect. This element was particularly useful to reinforce the children's awareness that their actions can have an effect.

The findings further indicate that the piano is particularly appropriate for engaging children on Level 4 and 5, as it allows them to embark on their musical journey and encourages talent in musical performance among these children. The design of the piano is direct and has immediate physical logic. This design facilitates direct

repetition and imitation for children with ASC who seek regularity and consistency. The findings reflect that children with ASC who function at Levels 4 and 5 exhibit the same music behavioural traits as savants (Miller, 2014; Ockelford, 2018). Such traits include absolute pitch and advanced memory skills, which were apparent in Children 8, 12 and 13. The development of these children suggests that the piano substantially fostered their musical progress, as they were able to learn through direct imitation.

The underlying assumption is that the effectiveness of using the piano to promote musical skills will increase the musical development of the children. Overall, the results indicate an increase in such progress over the course of the sessions. However, the rate of development varied across the three domains. These findings are in line with a study by Voyajolu and Ockelford (2016), which investigated the application of the original SoI framework for early-years musical development. The researchers postulated that children must become wholly competent at one level before moving on to the next level; however, the analysis implies that development was not as straightforward in reality, and SoI levels may overlap within a child's musical evolution.

The present study reflects this assertion, as the musical development of the children was based on their physicality, medical condition, cognitive ability and musical interest. A child who was more proactive and capable of producing sounds on the piano may have achieved significant progress in the proactive domain; however, in the reactive and interactive domains, the child could not attend to sounds that I made on the piano. Such inability can be due to several external factors, including difficulty with sensory integration, challenging behaviour and reluctance to interact with me as a result of a deficit in joint attention.

Despite the variety of external factors that could have affected the engagement and musical development of the children, the piano still proved to be a useful medium for engaging and promoting the musical skills of children with ASC who have learning difficulties. This study corroborates the two major advantages of reconceptualising the piano as a tool to teach children with ASC. All of the children in this study were able to engage with the same resource irrespective of their musical development or cognitive functioning. Thus, the project offered inclusion in music education, whereby children with ASC and learning difficulties could access piano lessons.

The current piano pedagogies fail to provide such inclusion, as there is currently no approach that positions the piano as a multisensory tool to engage children with ASC who have PMLD for the purpose of enhancing their musical skills. The piano has always been used as a traditional musical instrument to engage children in learning musical performance, musical literacy, musicianship and techniques, but no research has focused on its use as a multisensory tool for these children to enhance their musical skills. The piano has also served as equipment in improvisational music therapy sessions (Kim et al., 2009; Edgerton, 1994; Accordino, Comer & Heller, 2007) and as an intervention to improve joint attention and communication in children with ASC. Nevertheless, there is a lack of literature on the use of the piano as its own means to promote musical skill among children with ASC.

Ockelford (2009) wrote about the life of a 'prodigious' musical savant (Treffert, 2009), Derek Paravicini, as well as other children with ASC with whom he worked. Ockelford (2009) suggested that these children typically chose the keyboard or piano for its immediately accessibility as well as its immediacy and consistency of sound, which not all instruments share. Although the children in this study were not savants, Mottron, Dawson and Soulières (2009) theorised a particularly strong fit between the

cognitive demands of savant domains and the pattern of strengths that are displayed by individuals with autism. The present study is the first to propose the possibility of using the piano with children with ASC who have learning difficulties and diverge from the traditional 'piano student' profile to offer a medium for learning opportunities.

The flexibility of the piano allows for many ways to engage children with a wide range of cognitive functioning and of diverse musical development levels. For children with ASC who are non-verbal and have difficulties with communicating, the piano enables them and their teachers to musically engage in proto conversations and exchange messages that both parties understand without involving elaborate signage. This possibility can teach such children to recognise the concept of cause and effect, which could enhance their progress in musical development to create and produce more complex sound narratives. The piano can also promote interactive play through shared activity by sharing the instrument (Ockelford, 2013), which can improve engagement in joint attention. By offering appropriate strategies for the piano, teachers can foster the musical potential of children on a range of musical development levels.

8.2.2 Research question 2: Which strategies are appropriate for children at each level of musical-development?

The effectiveness of the strategies was gauged by the engagement of the children, which was measured quantitatively with a simple binary measure and subsequently subject to detailed IPA (see Chapter 3).

Level 2

This project used the piano a sensory tool in engaging children on Level 2 who are in the early stages of musical development. It specifically developed and tested two strategies in the reactive domain. Strategy 1 (R.2.A.1) used auditory learning, wherein

I made a range of sounds on the piano to teach the child that the piano is capable of making sounds. The average engagement of the children varied during this implementation. The average engagement of each child was as follows: 34% for Child 1, 36% for Child 2, 74% for Child 3 and 76% for Child 4. The children struggled with processing the source of the sound. This was particularly true for Child 1, possibly because she has glue ear. Children with ASC have a higher incidence of ear infections compared to their matched neurotypical peers, and low-functioning ASC children present an earlier onset of ear infections compared to those with high-functioning autism (Konstantareas and Homatidis, 1987). It is consequently difficult for the sound to pass through to the inner ear, which makes sounds more difficult to hear.

Other children's disengagement was affected by their attention and part of the core impairment of ASC. Strategy 2 (R.2.A.2) was developed to accommodate the use of auditory learning. I adapted two sensory modalities (i.e. touch and sound) to teach the children that the piano can make sounds. This technique allowed the children to 'feel' the source of the sound, which was the movement of my hand playing on the piano. The findings indicate that this strategy is an effective alternative for to strategy R.2.A.1, as both Child 1 and Child 3 registered high engagement rates of 80.81% and 83.47%, respectively, when I implemented the strategy. These rates suggest that the strategy was effective in using physical connection to teach an awareness of sound to children who have difficulty with auditory processing.

One strategy was developed in the proactive domain and required me to support the child in producing sounds on the piano. The findings indicate that all children had high engagement (Child 1: 76%; Child 2: 80%; Child 3: 89%; Child 4: 90%), which implies that the strategy was successful in teaching them to produce sounds. The qualitative analysis indicates that Children 2, 3 and 4 met the success criteria of the curricular

framework, as they created sounds on the piano without my support. Child 1 was the only participant who had difficulty with independently producing sounds; possible explanations concern poor executive function, as the literature review discussed that children with ASC exhibit delays in fine motor skills (Leary & Hill, 1996; Ozonoff et al., 2008; Lloyd et al., 2013).

In the interactive domain, I implemented two strategies. With strategy I.2.A.1, I initiated an interaction on the piano and waited for the children to respond. I often provided prompts, such as physical gestures, or simple instructions, such as calling the child's name or a simple word, e.g. 'Go'. The strategy was effective for both Child 3 and child 4, who exhibited the highest engagement (>70%), whereas Children 1 and 2 had not yet grasped the concept of cause and effect, possibly because of a joint attention deficit. Strategy I.2.B.1 involved the assumption that the children seek a response to sounds that they make, so I provided immediate responses, such as imitating back. The high level of engagement in the results indicates that the strategy was effective in using the piano to engage the children in interaction. Thus, the piano could be a particularly useful multisensory tool for teaching cause and effect and an awareness of sounds, which supports intentionally making sounds on the piano.

Level 3

At this level, the project still used the piano as a sensory tool for teaching patterns that can be produced on the piano. With strategy R.3.A.1, I used auditory learning by producing simple patterns on the piano to provide a listening experience. The findings indicate that the strategy was effective for the children, with the exception of Child 5, who achieved an average engagement of only 15%. The qualitative analysis reflects that this low engagement was due to difficulty with sensory integration, which affects most children with ASC who have learning difficulties. The challenging behaviour of

Child 5 was also a factor and disrupted his engagement with the task. External factors that affect children's disengagement warrant consideration when implementing this strategy.

In the proactive domain, I divided the strategy into two categories: one used auditory and kinaesthetic learning, whereby I held the child's hand or used the hand-under-hand technique to support the child in producing simple patterns; the other employed visual and auditory learning, wherein I used visual cues, such as pointing and labels. The results from the quantitative analysis support that the strategies were effective in engaging children to teach them simple patterns on the piano, as all participants besides Child 5 registered high engagement (>70%). The success of the strategy was evaluated against the success criteria in the piano framework (see Chapter 3), which indicate that strategies are effective if children can create simple patterns without physical prompt. Except for Child 5, who needed additional support, all participants achieved this goal.

In the interactive domain, I introduced the concept of imitation. This step corresponds with Ockelford's zygonic theory (2013), which dictates that when a child becomes aware of the possibility and significance of the relationships between single events (repetition patterns), the notions of 'same' and 'different' evolve in due course and underpin a sense that, through imitation, one sound can derive from another. I used the piano as an imitation tool to initiate 'call and response' activities, wherein the children learned to imitate simple patterns that I played.

Two strategies were implemented. Strategy I.3.B.1 involved the children imitating my patterns. The results reflect varied engagement among the children, but most participants had an average engagement of >60%, with Child 5 as the exception. These

outcomes suggest that the strategy was effective, as all children but Child 5 met the success criteria. To teach the children the concept of imitation, I combined this strategy with those of the proactive domain by using visual cues and physical support to reinforce their learning. I used Strategy I.3.C.1 to teach the children to recognise imitation of their own patterns. However, the results imply that the strategy was not effective, as Child 7 exhibited an average engagement of 65%, but all other children registered no engagement at all. According to the qualitative results, this lack of engagement might due to the deficit in joint attention among children with ASC who have yet to recognise their own sounds being imitated.

Overall, the results evidence that no single strategy can suit the learning needs of every child, so it is necessary to adapt to each child's preferred learning style and combine strategies accordingly for a multimodal approach. The research results imply that children with ASC who have severe learning difficulties benefit most from multimodal learning, which draws on the strengths and learning style of each child.

Level 4

At this level, I used the piano as a musical instrument to teach children at Level 4 to produce musical motifs. With strategy R.4.A.1, which used auditory learning, I provided broad listening experiences of musical motifs on the piano. The results indicate that the strategy was effective for Child 8 and Child 9, who had an average engagement of >80%, whereas Child 10's average engagement was only 7%, and that of Child 11 was 57%. Child 10 was an exceptional case and was reluctant to participate in any tasks. Moroever, he exhibited distress in all sessions. Since his engagement was low to non-existent, he withdrew from the project.

The qualitative results suggest that Child 11 encounters challenges in linking incoming data from different sensory modalities. He constantly disrupted my playing, which

might have been due to sensory oversensitivity that triggered him to play random keys on the piano to block out my sound.

Two strategies were developed in the proactive domain in two learning modalities: visual-auditory and kinaesthetic-auditory. The results indicate that the strategies were effective in engaging and teaching the children to produce musical motifs. The visual and auditory learning model was particularly useful for children with tactile defensiveness or sensitivity to touch, and Child 11 achieved 100% engagement during the strategy's implementation. Overall, the strategies were effective, as the children were able to create musical motifs without physical prompting. However, no case required only one strategy to achieve the aim; rather, I combined both strategies in teaching the children to produce musical motifs.

In the interactive domain, strategies were developed to foster the concept of imitation, and four elements were explored. For element A, I worked under the assumption that the children were expecting a response from me. The results indicate that Children 9 and 11 both exhibited an average engagement of >60% when I implemented the strategy, whereas Child 8 did not participate in the strategy because she did not initiate interaction and was mainly guided by me in all of her piano activities. Her behaviour can be explained though the ToM (see Chapter 2), which posits that individuals with autism have difficulty with inferring the mental states of others (Baron-Cohen, 2008), which leads to a deficit in joint attention. Gaining awareness of one's own sounds being imitated requires the ability to understand another person's action. A core impairment of children with ASC is a deficit in social communication, which could contribute to an unawareness of such imitation.

The implementation of strategies for element B yielded high engagement (>70%)

among all children. They imitated my materials accurately and without support, thus meeting the success criteria of the piano framework. Based on the qualitative results, the strategy involving imitation was particularly useful to teach the piano to children with absolute pitch. For example, Child 8 has absolute pitch and learned most of her musical motifs through imitation, which proved the strategy to be efficient. This outcome corresponds with studies by Ockelford (2008; 2013; 2018), which reported that, for individuals with absolute pitch, their ears drive their hands in playing the piano.

For element C, strategy I.4.C.1 was developed to enhance long-term memory skills in recalling previous learned motifs. I also used this strategy as a standalone one, wherein I deliberately played an incomplete motif for the pupil to complete and gradually expanded the material until the child could reproduce the entire motif at the end of the session. The results indicate that all children registered high engagement (>85%), with the exception of Child 9 (44.60%). Since the strategy relied solely on auditory learning, I implemented a second strategy, I.4.C.2, which involved visual cues to help the child recall the incomplete motifs. Child 9 exhibited 100% engagement when I implemented strategy I.4.C.2, which reflects that it was effective in using visual clues to engage children in recalling incomplete motifs.

For element D, I implemented the strategy only with Child 8. I supported the child in playing in turn or simultaneously, which yielded progress in musical development towards Level 5. The strategy effectively taught the child to alternate turns with me, which can facilitate the learning of extended materials. The child registered high engagement (>90%) in all sessions. Therefore, by providing appropriate strategies that match the child's learning strengths, a teacher can foster the musical potential of children with ASC who have learning difficulties.

Level 5

Children on Level 5 learned to play simple pieces. This level utilised the piano as a musical instrument for engaging children to promote their musical skills. According to the results, children at Level 5 possessed stronger attention skills. When I implemented strategies in the reactive domain, Child 12 and Child 13 evidenced relatively high engagement (>85%) and were able to sit attentively to listen to pieces. However, Child 14 registered slightly lower engagement (64.49%). The qualitative results imply that the scores were dependent on sensory integration, concentration skills and the child's own musical interest in the task. When I played familiar choruses on the piano, all three children demonstrated high engagement, which suggests that the use of songs and repertoires that the children enjoy can enhance their engagement.

In the proactive domain, I used several strategies to teach the children to play a simple repertoire. Besides applying the same strategies (visual and kinaesthetic) as I did in Levels 3 and 4, I included imitation and taking turns as two additional strategies. Children with absolute pitch, namely Children 12 and 13, preferred to learn the repertoire through imitation and some support from visual and kinaesthetic cues. As for Child 14, who did not have absolute pitch, visual and kinaesthetic strategies were the most effective. All three children met the success criteria of the piano framework and could play at least one short piece without any support.

In the interactive domain, I included the above strategies to teach the children to play simultaneously with me. Such strategies were effective, as all children registered high engagement (>90%) and could play simultaneously with me without any support. Overall, the findings illustrate that providing appropriate scaffolding as well as drawing on the child's musical interests, strength and preferred learning style can advance the child's musical potential.

8.2.3 Summary

The results reveal that the most effective strategies suited the children's level of musical development and preferred learning styles, and they were often multimodal (i.e. visual, auditory and kinaesthetic). Verbal music instructions were challenging to understand and follow for children with ASC with severe learning difficulties, and they benefited from the use of augmentative alternative communication, whereby I used gestures, PECS or short commands, such as 'Look', 'Go', 'Copy' or 'Loud'. The repetition of tasks and use of repetitive materials supported the musical aims and promoted higher engagement among the children. In addition, sourcing songs and repertoires in which the children were interested also enhanced their engagement. Finally, a sequential approach to materials and the introduction of concepts and learning aims may contribute to achievement and high performance, as the children in this project mastered one concept or skill before moving to the next one.

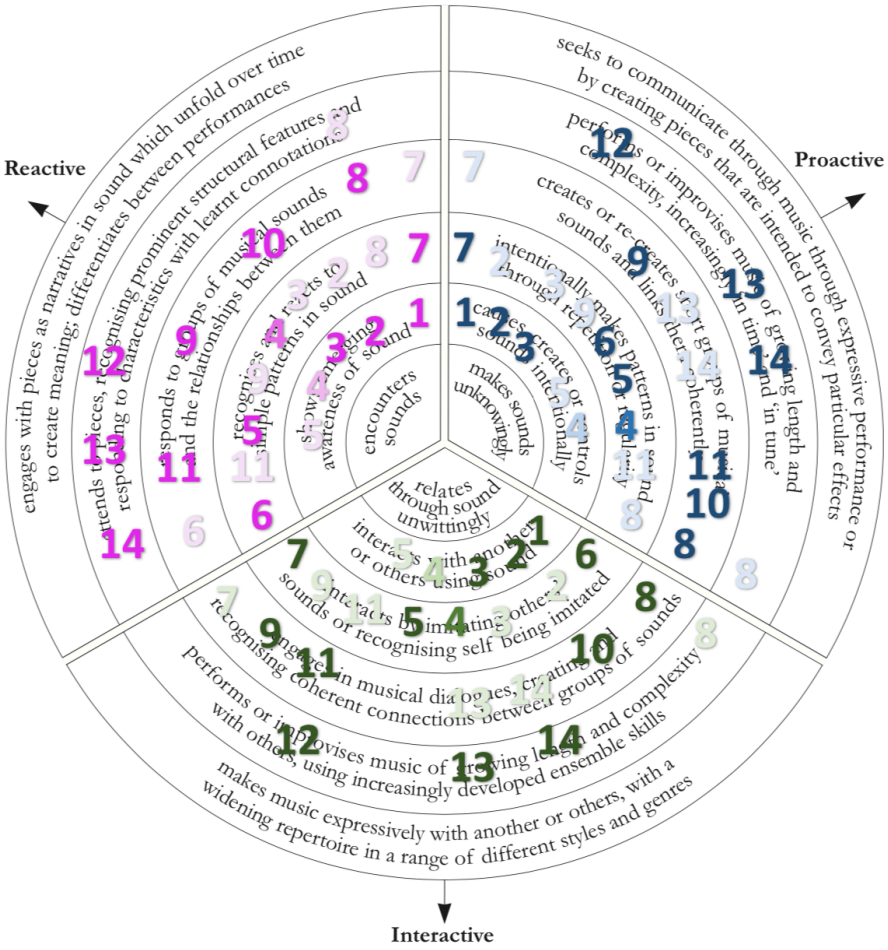


Figure 61. Concentric Profile of all children

The concentric profile in Figure 61 maps the musical development of all children throughout the sessions. When comparing the concentric profile of all the children, it is apparent that most of the children made progress throughout the sessions. The concentration pattern of their musical behaviours moved towards outer circles. Although some children remained in the same circle (i.e. level), they still demonstrated progress within the level itself by moving through the elements. For instance, Children 12, 13 and 14 remained at reactive Level 5 throughout the sessions; still, they reflected improvement in their musical development by listening attentively to a short piece (reactive Level 5 element A; refer to Table 3 in Chapter 2) and later recognising prominent features of most of the pieces (reactive Level 5 element B; refer to Table 3

in Chapter 2) after a couple of lessons.

Marvin (1998) has noted that the progress for children with complex needs ‘does not always equate with climbing a ladder of developmental skills’ (p. 125). It is inevitable to recognise that children with ASC who have severe learning difficulties will advance at varying rateis in different areas (Ware and Healey, 2018, p. 10). Educators should not overlook the importance of both the progress and stasis musical development of these children. Moreover, the current study stresses the importance of pedagogical thinking, as I provided and evaluated the task relative to each child’s ability based on their capabilities and functioning. According to Ware and Healey (2018),

> by identifying the central features of any task, it is possible to ensure that progress is made towards the point where a person with severe learning difficulties takes responsibility for reaching the goal even though they may not be able to perform all the mechanics of the actions involved. (p.10)

8.3 Generic findings linking to existing literature

The following aspects were identified during the study and can be linked to the review of existing literature.

8.3.1 Difficulties in sensory processing

The quantitative analysis reveals that children with ASC who have learning difficulties could not always engage throughout the sessions, and the detailed qualitative analysis of scenarios applied cognitive autism theories to determine underlying causes. According to the current DSM-V, difficulty with sensory processing is one of the diagnostic criteria for ASC. The findings of this study concur with those of Bogdashina (2016), who explained that individuals with autism present sensory impairments in one or more senses, such as hyper- or hypo-sensitivity or delayed perception. Such impairments may limit them in linking incoming data from different sensory modalities. Moreover, various studies associated individuals with ASC with an auditory processing disorder (Delacato, 1974; Grandin, 2006; Ornitz, 1974; Condon, 1975). This disorder appeared present in Child 1, who was in an early stage of musical development and unaware of sounds that I played on the piano. She was mostly off task during the first few sessions when I made sounds on the piano. Evidently, the child struggled to use her hearing to make sense of the sound's origin.

I applied another strategy that uses the kinaesthetic modality to complement hearing, and the results reveal higher engagement in the task. Although this strategy yielded higher engagement, Child 1 was sometimes delayed in responding to the stimuli, which reflects delays in processing. In addition, Children 4 and 5 demonstrated hypersensitivity to certain sounds, as they covered their ears when I played such sounds. Some children with ASC dislike the sensation of touch (Baranek et al., 2005). However, the children were able to tolerate my input most of the time, and the

engagement of Children 4 and 7 increased. Nevertheless, they may have needed more time to feel comfortable with me holding their hand, as they eventually started to tolerate the support.

8.3.2 Deficit in joint attention

According to the literature review, individuals with autism struggle to shift their attention between people and objects and experience a deficit in joint attention as a core impairment (Baron-Cohen et al., 1992; Charman et al., 1998; Mundy, 2003; Mundy & Newell, 2007). These issues explain the scenarios of children in the study who seemed to fail to respond to prompts, cues or labels of the letters and number on the keys. Some studies illustrated that children with ASC exhibit difficulties with imitation (Rogers, et al., 2003), which involves cognitive representation and visual-perceptual motor processing (Vanvuchelen et al., 2007) and is associated with the development of language, play and joint attention. The findings of this study accord with the literature, as some of the children failed to imitate my playing or imitated the wrong key. However, after I repeated the task and combined imitation strategies to yield a multimodal approach, some of the children exhibited improvement (Children 6, 8, 9, 11, 12, 13 and 14).

8.3.3 Absolute pitch among children with ASC

Although the participants in this study were not identified as musical savants, the findings reveal that children with ASC at Level 4 and above may exhibit certain musical behaviours, such as advanced memory skills and absolute pitch, that resemble those of musical savants. Mottron et al. (2009) theorised a particularly strong fit between the cognitive demands of savant domains and the pattern of strengths among people with autism. These strengths were found in Children 8, 12 and 13, who learned musical motifs and repertoires through imitation, whereby the sound in their ear led

their hand (Ockelford, 2013). Moreover, they could remember all of the materials even without the opportunity of practicing. With these traits, the children learned at a fast pace compared to the subjects who lacked them.

By identifying musical behavioural traits, such as absolute pitch and advanced memory skills, a teacher can unleash the musical potential of the children who possess them, thus providing an opportunity to learn instrumental skills at an early developmental stage to promote musical skill and well-being. As this study has frequently discussed, children with ASC respond to music because it is highly repetitive and has a well-defined pattern in its structure, which reveals predictable features. These elements are essential for children with ASC in all areas of daily life. According to Ockelford (2013), 'it is as though music, with its reliance on repetition, could have been especially devised for those on the autistic spectrum' (p.99).

8.3.4 Vygotsky's zone proximal development (ZPD)

The literature review explored the importance of the environment for learning and development in the early years. The environment must be first supported by an adult before the child can proceed to create and replicate the materials alone. Such support is known as scaffolding (Wood et al., 1976). The concept of scaffolding implies that the process of constructing knowledge occurs when someone who is more knowledgeable supports the development of such knowledge or ideas (Rogoff, 1990; Vygotsky, 1978). The findings in the study accord with Vygotsky's idea of scaffolding, as I supported the children in learning to create sounds on the piano (Level 2), generate simple patterns (Level 3), play musical motifs (Level 4) and perform repertoires (Level 5) before they were able to independently achieve these aims.

The results reinforce the importance of scaffolding in early learning stages to ensure

a child's success. In the literature review, I highlighted the teacher's role in encompassing all decisions that inform and frame the learning and teaching process. The findings of the study corroborate the idea that the children's engagement depends on the teacher's decision making regarding which strategies to implement at each musical development level.

When they received appropriate support, children at Levels 4 and 5 were able to play musical motifs and repertoires without prior knowledge of the instrument. This outcome is in line with Vygotsky's (1978) and Bruner's (1975) concepts of scaffolding, wherein the process involves an adult controlling those elements of the task that are initially beyond the learner's capacity, thereby permitting the learner to concentrate on and complete elements that are within his or her competence. Vygotsky posited that children can use imitation in guided activities to surpass capability limitations. The children in this study demonstrated an ability to play the piano independently when they received appropriate support. Vygotsky's (1978) argued that children's cultural development occurs on two levels: interpsychological (between people) and the intrapsychological (inside the child). By teaching children on a one-to-one basis in the early learning stages, instructors can provide an environment that suits the interpsychological level of function, which may in turn give rise to intrapsychological development.

My role was a critical component of the learning outcomes. In one sense, I was an action researcher, as I explored the most appropriate pedagogy for each pupil within and over the course of the lessons. Accoring to Vygotsky, the teaching-learning process takes place within the ZPD, where the learner can operate successfully with the support of the teacher. Therefore, in the study, I noted that my process of teaching directly influenced the pupil's learning. This process included the quality of the

lessons, teaching effectiveness, teaching evaluation and the teacher's personality.

According to Wiggins (2015), effective teachers adopt a certain approach. First, they consider the necessary measures to enable learners to understand the concepts and skills. In addition, they often start by choosing materials with which the learners are familiar. Once the learners engaged in the activity, these teachers remain sensitive to the successes and difficulties of the learner that emerge in the moment so that they can continue to scaffold learners who need support and then slowly retract to allow the learner to independently perform the task.

The approach that Wiggins (2015) has described corresponds with my teaching style in the study, whereby I used songs and pieces that the children liked and recognised in order to motivate them to engage in the piano activity. The strategies in the study were developed to assist me in supporting the children in learning the piano, and I constantly reflected on and evaluated the strategies that I applied. When necessary, I modified them during or after the lesson to serve the learning needs of the particular child.

8.3.5 Notion of capability

According to the Education Act 1981, the concept that individual needs along on a continuum is reinforced by a graduated system of action, interventions, individual education plans (IEPs) and on-going assessment. For children who are identified as having special educational needs, IEPs are composed up to identify their difficulties, potential learning barriers and appropriate strategies. While individuals are diagnosed as ASC based on the same diagnosis criteria in the DSM-V and ICD-11 (APA, 2013), each child possesses a unique functioning profile and range of learning needs. This was evident among all participants of this study; although they were assessed to

function at the same musical level as their peers, each child presented his or her own learning needs and challenges, which warranted a customised learning pace and style.

Hart and Whalon (2008) argued that it is vital to provide inclusive education for all children. Differentiation of the curriculum allows teachers to fulfil a range of needs through the provision of an inclusive learning environment and pedagogical approach that identifies and removes potential barriers to learning. This study supports inclusive education by imagining the piano as a multisensory tool to engage children with ASC irrespective of their cognitive ability, functioning and level of musical development. Children can engage with the same instrument in different ways to foster their musical progress and promote musical skills and well-being.

In this study, I acknowledged the learning difficulties of these children, and the strategies and materials that I used with them were adjusted to their needs. In parallel to these differences, which do not carry negative connotations, I also recognised and celebrated the strengths and abilities of the children. To this end, I adopted Terzi's theory notion of capability (Terzi, 2005) and Fraser's (2000) definition of 'recognition remedies'. These theories provide a basis for inclusive pedagogical practices and, in particular, constructions of thought for music teachers. By reframing the role of the music teacher in relation to these learners, this study provides insight regarding inclusive pedagogical practices in terms of the opportunities they offer to such individuals to participate, be recognised, engage and be respected.

The findings concur with inclusive pedagogical practices, as they evidence my introduction of new concepts and skills in accordance with the assessed abilities of each child as well as the celebration of each child's individual musical journey. The findings reveal that each child progressed at his or her own rate and, with gradual

introduction of the strategies and materials, eventually grasped the knowledge before moving to the next piece.

People are diverse in three fundamental ways: their personal characteristics, such as gender, age, and physical and mental abilities; their external circumstances, such as environmental factors; and their ability to convert resources into functioning (Sen, 1992; Terzi, 2005). During the sessions, I acted as both the researcher and the teacher, so I considered the above aspects. I selected and tailored the materials and techniques according to individual characteristics and physical and mental abilities. Pedagogical thinking was a crucial element of this research, as the children benefitted from systematic and sustained educational input, yet my role as the teacher as well as the quality of my teaching affected their engagement and success. In this study, my thought process and decision making regarding which strategies to use influenced the children's engagement in their learning process. Therefore, when implementing strategies to teach this population, it is important to observe the reactions of the children before deciding which strategies to implement.

This study also incorporated the idea of 'artful teacher scaffolding' that Wiggins and Espeland (2012, p.343) have proposed. According to these scholars, artful teacher scaffolding entails a 'high level of understanding of learning and teaching as well as, in arts education settings, a high level of understanding of the art form and art activity being taught' (Wiggins & Espeland, 2012, p.343). The presumption is that the essential element of successful music teaching is an extensive and insightful understanding of both musical and learning processes.

In this study, I utilized my knowledge as a piano teacher, autism pedagogy, and the SoI framework to develop a unique piano pedagogy framework that may be suitable

to teach the piano to children with ASC who have severe learning difficulties and diverse musical-development levels. The findings suggest that the use of different learning modalities to accommodate individual strengths and challenges for each individual with ASC as well as adapting lesson plans to the skill level and functioning of the child yielded the highest engagement during the sessions.

I adjusted my communication style by incorporating symbolic gestures to communicate with children who were non-verbal or used limited words. This strategy is compatible with current pedagogy approaches that are widely used by schools and educators in the UK (Odom et al., 2014; Mesibov et al., 2015; Ganz et al., 2012; Bondy, 2012; Neeley, et al., 2015). The notions of capability and inclusive pedagogical practices allowed me to not only meet individual learning needs and abilities but also celebrate the strengths of the children and promote their well-being.

In this project, I conducted child-centred lessons in a stimulating, joyful and invigorating atmosphere, as I believe that music involves not only learning but also having fun. Treffert (2009) described music as the language of eternal childhood, while Hargreaves (1998) asserted that play is a vital part of children's lives and facilitates the most effective learning. By recognising the differences in functioning and ability among these individuals, I could tailor my pedagogical approaches to address feasible functioning goals (Terzi, 2005). Musical learning teaches musical elements to promote musical skills and also offers a range of emotional and social benefits for children with ASC and learning difficulties.

This study explored the use of the piano to promote interactive play and shared attention between the child and teacher, which encouraged the children to engage in and appreciate human contact. This outcome in turn promotes intimate and developing

communications, engenders a relationship of affection and trust, and encourages more coherent purposefulness, awareness and memory. It is also especially valuable when verbal communication is severely limited or impossible.

8.3.6 Children with ASC who have learning difficulties benefit from structure, order and predictability.

According to National Autistic Society (2015), routines are often essential for children with ASC, as they introduce order, structure and predictability, which mitigates anxiety. I discovered that the children in this study benefited from a consistent structure in their sessions i.e. introductory song, piano activities, goodbye song. Thus, the children could predict the next task, which reduced their anxiety. As they became familiar with the structure of the session, their engagement increased, and they started to sing along while I played the piano or could refer to pieces that they wanted to play (Child 13). These findings accord with the elements of TEACCH (Mesibov, Shea & McCaskill, 2012; Mesibov, Howley & Naftel, 2015), which adapts structured teaching as the primary intervention and educational strategy to teach children with ASC.

The findings also concur with the elements that Dawson, Osterling and Guralnick (1997) identified as essential for the effectiveness of intervention programmes. Specifically, they stressed the importance of a structured environment as well as predictability and routine to help the child transition from one activity to another.

8.3.7 The use of visual cues in improving engagement

The literature extensively documents and emphasises the use of visual aids (Mesibov et al., 2015; Ganz et al., 2012; Siegel, 2000). I found that the use of visual cues during sessions, such as by pointing to the keys or applying visual labels, improved engagement in the task and complemented children who exhibit tactile defensiveness or sensitivity to touch. This finding supports the literature, which states that some

individuals with ASC are visual learners (Mesibov et al., 2015; Ganz et al., 2012; Siegel, 2000) and that such children benefit from prompting techniques while learning (Bondy, 2012).

8.4 Contribution to Knowledge

This study entailed preliminary research to explore the potential use of the piano as a medium for teaching musical skills to children with ASC who have severe or profound learning difficulties. The findings make several noteworthy contributions to the literature. First, the study has reconceptualised the piano as a multisensory resource that can engage children with ASC in a variety of proto-musical and musical ways. Second, it details original strategies that were developed for thestudy. The original framework is laid out with the following themes:

1.) Sounds of Intent element
2.) Sounds of Intent descriptor
3.) Piano pedagogical context
4.) Pupil's engagement
5.) Teacher's input
6.) Anticipated learning
7.) Success criteria

While the strategies that were developed displayed effectiveness in teaching children with ASC with severe learning difficulties, several modifications have been noted at the end of the study. For instance, the modified framework includes new strategies which contributed to success in the children's learning but did not appear in the original framework. Moreover, it is apparent that the standalone strategies are effective, yet most of the children benefitted from the use of a combination of

strategies to support their learning. This aspect was also not part of the original framework. Therefore, the new modified framework features a column which provides suggestions to piano teachers in regard to potential strategy combinations that can maximise children's learning. The teacher's input and pupil's engagement columns have also been supplemented by more details so that piano teachers without a specialty in autism can follow and replicate the strategies in the future.

In addition, the modified framework incorporates the levels of the SoI framework to provide clearer information for teachers who have not previously used the SoI framework. The colour scheme of the table was changed to follow the colour scheme of the original SoI framework (pink = reactive, blue = proactive and green = interactive), wherein the colour shading increases with the levels. Table 86 contains an example of the modified framework, while the Appendix 21 offers the complete modified framework. The newly added features are highlighted in red. The developed strategies comprise a multimodal learning model which draws on the strengths and learning styles of children with ASC. Thus, they represent a novel contribution to current piano pedagogies in the UK, which are heavily dependent on one modality.

The new approaches redefine the structure of piano pedagogy to employ 'pre-structural' stages in the evolution of musical understanding as opposed to traditional piano pedagogies, which follow a conventional progress of musical development through a series of tutor books to learn musical literacy, performance and musicianship. Therefore, this study provides new insight into the field of piano pedagogy, which currently lacks approaches for mapping the progress of piano learning in early-years musical development.

Finally, this study examines learning opportunities for children with ASC who have

learning difficulties and do not fit the mould of a conventional ‘piano student’. As such, it promotes their inclusion in music education.

Level	SoI Element	Sounds of Intent Descriptor	Piano Pedagogical Context	Pupil's Engagement	Strategies Code / Teacher's Input	Additional information	Anticipated Learning	Success Criteria
2	R.2.A	Shows an awareness of sounds – potentially an increasing variety	In this context, the piano will not be used in the conventional way, by which the teacher teaches the child to play the piano. Instead, the piano is used as a resource tool for making a range of sounds. It acts as a percussive instrument which the teacher uses to show the variety of sounds that it is possible to achieve on the piano. This assists the child to explore the various sound textures.	The child listens. The child may not approach the piano and listen to the sound in a conventional way. The child may wander off, put their hands on the soundboard to feel the vibration, or put their ear to the piano to listen to the sound.	**R.2.A.1** The teacher demonstrates making a range of sounds and playing short pieces on the piano. **R.2.A.2** The teacher uses hand-under-hand/hand-over hand technique to assist the children to 'feel' the source of the sound.	1. The teacher should allow ample time for the child to respond or process the sound. Wait at least 10 seconds before another attempt. 2. These two strategies can be used alternately on the same child. E.g. The teacher uses R.2.A.2 initially to assist the child in gaining awareness of sound from the piano however the child cannot tolerate the tactile input throughout, the teacher can then change the strategy to R.2.A.1.	The child comes to appreciate that the piano is capable of making sounds	The child reacts to sounds made on the piano, eg. Through facial expressions (smile, vocalise, laugh etc)

Table 86. Modified Piano Framework (Example)

8.5 Implications for piano pedagogy

The aim of this study was to explore piano pedagogies for teaching the piano to children with ASC who have severe learning difficulties or PMLD. It used the piano in two ways: as a multisensory tool and as a traditional musical instrument. The literature on current piano pedagogies presents similar learning and teaching elements, such as musical literacy, musical performance, techniques and aural skills. These elements were designed for children who have reached a certain musical development stage and possess an understanding of musical structure.

According to Voyajalou and Ockelford (2016), children vary in terms of the age at which they develop an understanding of musical structure. This study used an increase in age that corresponds with moving up the levels of the SoI framework. This project expected children from 21 months of age onwards to engage with music at Level 3 or above. This expectation is consistent with the teaching elements of the piano pedagogies for teaching children that are currently available in the UK. However, such pedagogies mainly target neurotypical children who start at the age of three or above. By this age, the children have already developed an understanding of musical structure (SoI Levels 5 and 6), and they proceed to learn about musical literacy, performance, techniques and aural skills. These teaching elements exclude children who do not fit into this learning category, including those who have ASC and severe learning difficulties or PMLD.

Ockelford (2018, p.193) stated that 'it was evident that there is a "pre-structural" stage in the evolution of musical understanding, in which sounds are relished and produced purely for sensory pleasure, without being consciously organised'. The original SoI framework discovered that some children with PMLD were able to cognitively process sound to only a very limited degree, if at all. In neurotypical development, this

progress corresponds to that which occurs *in utero* more than three months before birth. This study developed new approaches for SoI that consider the teaching and learning elements of piano from a new perspective for children or young people who learn the piano in the early years of musical development. The study contributes to current piano pedagogy which promotes inclusion in music education, as the approaches it developed are applicable to teach not only children with ASC who have severe learning difficulties but also other special education needs (SEN) children with PMLD who are in an early stage of musical development.

8.6 Limitations of the research

There were a number of limitations to this research. In view of time and resources, I carried out only 13 sessions over the course of the implementations. This period of time is short considering that children with ASC who have severe or PMLD might need more time to respond to an effective strategy. In addition, missing data due to pupil absence may also have impacted the effectiveness of the strategies and, therefore, the findings of the study.

The coding system that was developed for evaluating the children's engagement may also have posed some limitations. Despite high interrater agreement ratings, determining task engagement can be challenging, as it is not possible to establish whether the results are affected by only the effectiveness of the strategies or if they also involve other external factors, such as the complicated functioning of the children or their mood on the of the session.

As another consideration, the role of the researcher as the sole teacher in this study inevitably imposed bias. Although I kept detailed notes and was mindful throughout the study, it was impossible to completely remove bias from the data analysis process.

The fact that only one teacher (me) delivered the strategies might have influenced their effectiveness. Having another teacher to implement the strategies could provide firmer results. However, these strategies are initial points to promote functioning, inclusion and wellbeing, so others could adapt and not necessarily replicate them.

8.7 Directions for future research

Future research on the effectiveness of strategies that may advance musical development level in children with ASC and learning difficulties as well as studies on the use of the piano to promote musical skill might benefit from the involvement of other piano teachers who have no prior experience with teaching children with ASC. These teachers can then provide feedback to evaluate the effectiveness of the strategy and provide modifications or improvements, which could yield more definitive evidence regarding the effectiveness of the strategy.

Further research should be performed with more participants within a longitudinal study to allow the strategies to be generalisable, and it can monitor the effectiveness of the strategy over time. More research could also be carried out by implementing these strategies with other instruments.

Morever, future research should investigate the nature of participants' musical background and what counts as music to them to determine whether this has an effect on their engagement. In addition, further examination of the detail of learning outcomes is needed with particular regard to: a.) number of sessions and b.) the length of the session to explore if their musical development and progress are related to the length and consistency of the educational process.

In addition, further research could explore if the piano is a suitable instrument to promote social engagement and wider development among children with ASC, as the

instrument already demonstrated suitability to promote interactive play between two people.

8.8 Conclusion

The findings of this study reveal that the versatility of the piano renders it suitable for use as a musical instrument to teach piano skills to children with ASC at Levels 4 and 5 of SoI. Moreover, it displays promise as a multisensory resource to engage children with ASC who are in an early stage of musical development (Levels 2 and 3 of SoI) and to promote their musical engagement and skill development. The participants exhibited a variety of responses, which suggests that each child is unique and has a preferred learning style. Therefore, one should expect to impose a particular strategy that suits the learning style and needs of the children.

The study reveals that the most appropriate strategies at each level were those which drew upon the strengths and learning styles of the children. This finding addresses the central hypothesis of this study. The success of the children's learning also depended on my thought process and decision making with regard to how and when to implement strategies that affect the children's engagement. Although the study is not generalisable because of its small sample size, it identifies strategies that demonstrate success with this group as a whole and indicates that they benefited from a systematic and continuous pedagogical approach.

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Appendix 1

'The research for this project was submitted for ethics considreration under the reference EDU 16/097 in the Department of Educaition and was approved under the procedures of the University of Roehampton's Ethics Committee on 5th April 2016.'

Appendix 2 – Ethics Form

University of Roehampton London

Ethics

APPLICATION FORM

(Staff and Research Students)

PLEASE CHECK THE RELEVANT BOX *(NB. double click on the check box and select 'checked')* MEMBER OF STAFF ☐ RESEARCH STUDENT ☒ (MPhil, PhD, EdD, PsychD) EXTERNAL INVESTIGATOR ☐ STUDENT (Other)** ☐ *If you are a transfer student or conducting collaborative research you may not need to complete this form: please see Section 2.2. of the Guidelines. **If you are on a taught course you do not need to complete this form unless your project is worth more than 50% of your total credits or you have been asked to do so by your supervisor*	
SECTION 1: PERSONAL DETAILS *Please complete the header with your name and Department*	
Name (lead):	Wei Sam Soo
Other investigators:	-
Correspondence address:	Flat 64, Cedar Court, Pages Hill, N10 1EG, London.

Telephone no:	07902114072
Email:*(all correspondence will be sent by email unless otherwise requested)*	Samyee91@gmail.com
FOR STUDENTS ONLY:	
Programme of Study & Department:	MPhil/PhD, Department of Education
Mode of study (full-time/part-time)	Full time
Director of Studies & Supervisor: (If you are on a taught course please just give the name of your supervisor)	Director of Studies: Professor Adam Ockelford Co-supervisor: Dr. Susana Castro
FOR EXTERNAL INVESTIGATORS ONLY (please see Section 4.5 of the Ethical Guidelines):	
Name of Academic Assessor:	

SECTION 2: PROJECT DETAILS

Title of project:	Exploring the application of the Sounds of Intent music-developmental theory in piano pedagogical contexts for children on the autism spectrum. (Please include name of project on participant documentation if different)
Proposed start date: *Please note that approval can take some time. Please submit applications in a timely manner. Reasons should be given for late or retrospective submissions in*	As soon as possible after approval *(Applications should only be submitted*

order to secure approval.	*retrospectively in exceptional circumstances. These will require the approval of the Chair of the Ethics Committee).*
Duration:	01/2016-01/2018

Purpose of the proposed investigation:

This section should include the material which concisely outlines the rationale for the project, i.e. why this study needs to be done. This should be done in a way that is both accessible and scholarly, i.e. have proper cited sources.

This research will explore the use of the piano as a musical resource in promoting musical skills and wider learning in children with autism and learning difficulties, known as 'classic' autism (Baron-Cohen, 2008, p.16). The project is based on the 'Sounds of Intent' ('SoI') framework which identifies six stages of musical development, set across three domains of musical engagement: 'reactive', 'proactive' and 'interactive'. While the SoI research (Welch, Ockelford, Carter, Zimmermann and Himonides, 2009; Ockelford, Vogiatzoglou, 2010; Vogiatzoglou, Ockelford, Welch and Himonides, 2011) has generated a number of resources for practitioners working with children with learning difficulties (see www.soundsofintent.org), little attention has been paid to the use of instruments, particularly the piano. This is a significant knowledge gap, as other studies suggest that the piano is a particularly suitable resource for children on the autism spectrum due to its immediacy, consistency and capacity to produce multiple sounds at the same time (Ockelford, 2007; Ockelford, 2013, p. 289-323). With this in mind, my research aims to develop pedagogical approaches to using the piano, and test their effectiveness in stimulating learning and social engagement in children with classic autism.

The Sounds of Intent framework recognises two ways in which music and musical sounds may be of value to children with disabilities: as a

system of communication in its own right, and as a support for communication in other domains (Ockelford, 2013, p. 166). The framework fits within the broader development of communication, which has been conceptualised as having three domains: 'reactive' (the equivalent of 'receptive' in language), 'proactive' (the equivalent of 'expressive' in language) and an additional 'interactive' domain unique to music (a combination of the reactive and proactive).

The piano has been chosen because of its ability to illustrate clearly the cause-effect relation in the early stages of musical development: pressing a key will always have the same effect. By offering a clear response of acknowledgement as soon as children initiate sounds on the instrument, teachers can reinforce their awareness that what they do can have an effect, thus contributing to 'developing cognisance of a sentient "other" out there' (Ockelford, 2013, p.203). Unlike string or brass instruments, where the production of sounds may not have an immediate physical logic, the design of the piano means that it has an immediacy and consistency of sound: pressing a given key will always generate the same pitch, regardless of technique. Thus it provides a particularly useful medium for direct repetition and imitation, which is suitable for children with autism who seek regularity, simplicity, and consistency. In addition, the instrument's design enables the children and tutors to engage in 'proto conversations', meaningful exchanges which transmit a message understood by both parties without involving elaborate signage, such as the communication between a mother and her baby. Furthermore, through its very size and materiality, the piano promotes interactive play through shared activity (Ockelford, 2013, p.203). Shared attention is a significant notion here. By concentrating on the same keys and on the process of imitating the production of simple sounds, the attention of teachers and children are attuned to each other: one demonstrates, the other imitates, then imitation is itself supervised, leading to an attention feedback within the space created around the instrument. This can generate a meaningful, yet simple bond between

the adult tutor and the child, as they work closely on a one-to-one basis. Therefore, it is my belief that the piano is an ideal instrument to be used as a musical resource for promoting the musical skill and wider development of children with autism.

The crucial component of using the piano effectively as a resource for development lies within the pedagogical approach employed by teachers. Despite a surge in piano pedagogy research in the last two decades (Burwell, 2012; Fisher, 2010; Gaunt, 2010), there has been no exploration of how it might be employed in teaching children on the autism spectrum. This is a serious lacuna in piano pedagogy research, as increasing evidence has shown that children on the autism spectrum benefited from learning the piano (Ockelford, 2007; Ockelford, 2013). Further studies in this area will be able to provide suitable pedagogical approaches, showing with the appropriate support it is possible to manifest talent on musical performance among these children (Levels 4 and 5 on Sounds of Intent).

In summary, the aims of the project are:

1. To investigate the use of the piano as a medium for engaging children on the autism spectrum who have learning difficulties through music, to promote musical skill and engagement.

2. To determine whether certain pedagogical strategies may be particularly appropriate for children with autism at different music-developmental levels.

3. To explore whether piano teachers with no prior experience of teaching children with autism, can adopt the newly developed

strategies to teach the instrument to this group, thus promoting joint attention in music development and engagement.

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Outline of the project:

This section should include the details of the methods i.e. what will be done and how.

The project proposed will be divided into three phases which each address one of the aims of the project:

Phase 1

Method

Participatory intervention case study

Three children will be recruited from each Sounds of Intent Level 2, 3, 4 and 5. The levels are identified as musical engagement that correspond to core perceptual and cognitive abilities as shown below:

Level	Description	Core perceptual/cognitive a
2	Awareness and Intentionality	An emerging awareness c entity and of the variety t domain of sound.
3	Relationships, Repetition, Regularity	A growing awareness significance of relationsh aspects of sounds – particu
4	Notes forming Clusters	An evolving perception of g relationships that may exist
5	Deeper Structural Links	A growing recognition of frameworks of pitch and tim

Table 1: Core perceptual and cognitive abilities associated with the Sounds of Intent music-developmental framework (Ockelford, 2008).

For every level, children will be taught using a number of approaches,

with the purpose of identifying the most effective teaching strategies. The rationale is based on conditions set out by Yin (2009), who stresses that a case study allows an in-depth, detailed examination of each participant. In this project, this level of close scrutiny is fundamental for designing and assessing the best strategies for teaching piano to autistic children. Furthermore, despite not being generalisable due to the small sample size and exploratory character, a case study can generate hypotheses for further enquiry. In this project, the piano strategies that show most potential will be recommended for further testing on a larger sample. Participant intervention, in turn, will allow me to test the effectiveness of pedagogical strategies designed for improving the skills of autistic children across every level of musical development. It is only by organising structured interventions that the most effective strategies can be selected.

Sample

Twelve children between 5 to 19 years of age will be recruited from special schools in the Greater London area. 5–16 is the age range of compulsory education in the UK, however some of the children with ASD will continue at school to age 18 or 19. The sample will include a mixture of boys and girls who have no prior experience of playing the piano or having instrumental lessons. Because autism is a condition with 80% male prevalence (Fombonne, 2005; Kogan et al., 2009), it is likely that around 70-80% of the children included in the samples used in this project will be male. Children included in the sample must be diagnosed with level 2 and 3 severity on the autism spectrum, based on criteria set by Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V) (American Psychological Association 2013), by school psychologists and/or through Education, Health and Care (EHC) plans provided by the school. Parental consent will be obtained for each participant including accessing the child's EHC plan. Parents will be informed of the objectives of the study, the methods of research and expected timeline, as well as the possibility of withdrawing the children

at any time without any repercussions. This will be outlined in a standardised consent form, which will be distributed to the parents of suitable children. They will be encouraged to read in detail, scrutinise, then sign the form before their children's participation in the project can begin. An introductory meeting will be carried out to meet the carers to explain the purpose and process of the study. They will then be asked to gather consent where this is possible given the level of conceptual understanding and ability to convey his or her wishes from the children without my presence so that I do not intervene or try to persuade the person to take part. Consent will be conceptualised as a continuous process rather than a one-off agreement. Parents or carers as well as children will have the right to withdraw at any point from individual sessions or from all sessions. There is no compulsion or pressure to take part in the project, and that should a young person decline to participate or subsequently withdraw, their treatment will not be adversely affected. This process is elaborated in the ethical issues section.

Data Collection and Access

Special needs schools will be approached via email to identify suitable participant children. They will be presented with a project information sheet that outlines the object of the research, the methods, expected timeline and input required from schools, parents, and children. Head teachers will be encouraged to read and scrutinise the information carefully in order to understand the project and their role in it. Depends on the availability of suitable candidates from the schools, it is anticipated that only one special school will be involved in the project. Once access to the schools is established, an introductory meeting will be carried out to meet the staff and the parents of suitable children with tailored project information sheets and consent forms. Upon obtaining parents' written consent, data collection will start with looking through the EHC plans of each participant, in order to gather his or her background and general information. After this, a semi-structured interview will take place with the music teachers of participating children

to obtain more biographical details, special interests and talents, forms of communication, behaviours, sociability and personality characteristics of the children. It is anticipated that the interview will involve two music teachers and the interview will take 20 minutes each. The interviews will be audio recorded with participants' permission. The reason for obtaining the above data is to help in planning the piano sessions to tailor individual lesson such as preparing suitable repertoires and activities according to their musical preference. Gathering information about the child's behaviour and personality will support the anticipation of reactions during the piano sessions. The questions are adapted from a study conducted by Pring and Ockelford (2005), 'Children with septo-optic dysplasia – musical interests, abilities and provision: Questions are included as followed:

Music teachers

1. Which Sounds of Intent level is the child on?
2. Does the child have a particular interest in music? Why do you think so?
3. Does the child have a favourite piece, pieces or type of music? If yes, please describe briefly.
4. How long does the child will engage in a music lesson?
5. Does he/she interact with others during music lesson? If so, in what ways?
6. How would you describe the child's musical ability?
7. If the child has a propensity to display challenging behaviour, how do the staff at school support the child to manage it?

One full day visit will be made prior to the start of the project to discuss with the teachers and carers regarding the safeguarding policies and procedures of the school. I will read the safeguarding policies very thoroughly and will follow all the rules and regulations in order to know how to act upon unforeseen circumstances such as if a child attempts to

physically assault me or become distressed during the session. There are likely to have physical contact between me and the child when conducting the session such as guiding hand over hand, procedures and precautions in carrying out such physical contact will be discussed with the carers and teachers. I will obtain information from the carers and teachers regarding how far the child can be encouraged to do activities that may be unfamiliar and what is the procedure to follow if the child does not cooperate. I will also ask the teaching assistant to be present in the room with me during all the sessions so that he/she can indicate to me when the child is distressed and I should stop the lesson immediately.

As I will be conducting the lessons not the teachers, I will discuss the arrangement of the piano sessions and the availability of the music room and piano with the school prior to the start of the project. I will also discuss with the teachers what precautions should I be aware of when setting up a video camera and if such technology is attractive to the child. It is anticipated that two video cameras will be mounted on tripods to be used for video recording. One video camera will be set up by the side of the piano filming the sessions where the face of the child and the researcher can be seen; and another video camera will be recording from the top of the piano showing just the hands of the child where face will not be seen. I will pilot the position of the video cameras before the project starts in order to seek the best solution in filming the session. Alternatively, I will be asking the carer to film the session if he or she agrees to do so. This will be discussed with them during the visit. Parents will be given the option of whether the video material may be used for publications and presentations. A permission form will be distributed prior to the start of the project. Carers will be asked to consent to appearing in the video too.

One-to-one weekly piano lessons will be arranged for the Summer term

of 2016, from April to July, with breaks for half term. It is anticipated that piano sessions will last between 5–20 minutes, according to the child's interest and willingness to cooperate. They will follow a consistent structure across all levels of musical development, in order to familiarise children with the lessons and make them able to predict what is happening in the piano room. More specifically, the format of the session will start with an introductory song before commencing a range of activities on the piano. The introductory song will give the children a sense of what is happening in the lesson before commencing activities on the piano. The goodbye song at the end will give a sense of completion. There is evidence that having structured sessions facilitates learning and engages for children with autism (Mesibov, Shea and Schopler, 2004).

Data Analysis

I will be analysing the videos taken from the piano sessions qualitatively and quantitatively, using the Sounds of Intent data session entry provided on the Sounds of Intent website (www.soundsofintent.org). The purpose of this incremental qualitative analysis is to determine which strategies are suitable and most effective in teaching children with autism at each music-developmental level.

The effectiveness of the teaching strategies will be evaluated based on the Sounds of Intent framework evaluation that has been modified to suit the piano pedagogical context. For instance, children on reactive, Level 3, Element A:

	Evaluating engagement
1.	No evidence

2.	Responds to repetition in relation to at least one pitch on the piano.
3.	Responds to repetition in relation to at least two pitches on the piano.
4.	Responds to repetition in relation to at least three pitches on the piano.
5.	Responds to repetition in relation to at least four pitches on the piano.
6.	Responds to repetition in relation to five pitches on the piano or more. (i.e a short repertoi

Gauging consistency	
1.	Responses to repetition are observed rarely (on around one in eig
2.	Responses to repetition are observed occasionally (on around o
3.	Responses to repetition are observed regularly (on around on
4.	Responses to repetition are observed frequently (on around thr
5.	Responses to repetition are observed consistently (on around seven i

An example of the framework is provided below:

Sounds of Intent element	Sounds of Intent descriptor	Pupil's engagement	Teacher's input	Anticipated
R.2.A	Shows an awareness of sounds – potentially an increasing variety	Child listens	Teacher demonstrates making a range of sounds and playing short pieces on the piano	Comes to a that the p capable of soun
				Comes to a that differe are possib pian

						sounds

Triangulation will then be carried out with two practitioners who have been trained in SoI acting as a 'blind assessor' who will assess a 10% proportion of the videos. It is anticipated that music teachers from the school will act as the blind assessors. The assessment will take approximately 30 minutes outside of their working time. Videos will be randomly distributed to the music teachers for assessment, in order to reduce any detection bias (Grimes and Schulz, 2002). Consent will be obtained from the music teachers prior to the start of the project.

Phase 2

Method

Online questionnaire

The newly developed materials will be placed on the SoI website (which has around 2.5 million visitors a year) in order to trial their efficacy on a larger sample. The purpose of distributing the materials through the website is to stimulate an audience of piano teachers, music teachers, music practitioners and therapists to implement the strategies and monitor their effectiveness. An online survey will be put on the SoI website along with the materials for those users who have tried the approaches, to acquire feedback. This is a voluntary project for the respondents to take part in the survey and no incentive will be given however the developed materials will be shared with them. The questionnaire will be created through Weebly (www.weebly.com). Therefore, anonymised answers will be kept within the Weebly database. Each respondent will be requested to create a respondent ID for confidentiality of identity. There is no compulsion or pressure for the

respondents to continue in taking part in the survey should they decide to withdraw, they may exit the survey at anytime without giving any reasons. Any demographic data provided will be destroyed at their request however anonymous data (for example answers for the online survey) may still be used, from which they cannot be identified. The privacy policy for Weebly can be found at https://www.weebly.com/uk/privacy. A password encrypted hard drive will be used to store any questionnaire data that is extracted from Weebly.

Data Collection

The survey will be put on the SoI website using Weebly (www.weebly.com). The survey will contain a short introduction of the materials and the purpose of the current study. A regular reminder will be put on the website for all participants to complete the questionnaire before the closing date. Participants are informed that withdrawal is accepted at any time. A complete questionnaire will only be available after the completion of Phase 1, however a sample of the format of the questionnaire is attached as an appendix to the form. A copy of the final survey will be sent to the ethics committee once it has been completed.

Data Analysis

Respondents will be requested to watch a series of video, which comprise of the teaching strategies that I have implemented in phase 1. Each video will last for one minute. It is anticipated that 16 videos will be uploaded onto the SoI website. Respondents will be requested to take part in the survey associate to the videos that they have watched. They will be requested to describe the interaction between the child and the researcher, the effectiveness of the teaching strategies and their opinions on what can be improved. As most questions will be answered

by marking on a Likert scale, the data will be analysed quantitatively. Open questions will also be provided in the survey to obtain in-depth answers from the respondents to generate richer qualitative data. The survey will take approximately a minute to complete. My aim is to get at least 100 respondents to assess the strategies.

Phase 3

Method

Follow-up case study

I will advertise my project on Incorporated Society of Musicians (ISM), European Piano Teachers Association (EPTA), Musician's Union (MU) and SLD forum to recruit eight piano teachers who have no experience in working with children with autism to try the materials to conduct a follow-up case study. Permission will be obtained from all the organisations involved above prior to the recruitment. Participants will be selected based on certain criteria: they have to live in the Greater London and will be required to write a brief introduction of why they are interested in the project within given closing date. The study is voluntary and there will be no incentive given; however this will be an opportunity of professional development and the developed materials will be shared with the teachers and their participants. The purpose of conducting this study is to further explore whether the new strategies can be successfully applied by piano teachers with no prior experience of teaching children on the autism spectrum.

Piano teachers will be provided with a one-day introductory session at the University of Roehampton to explain the study and how it will be carried out. The introductory session includes giving out consent forms with the objectives of the study, the methods of research and expected timeline, as well as the possibility of withdrawing at anytime. Parental

consent form will also be distributed to be given to the child involved in the study and a permission form to video-record the sessions. Participants will be given two weeks to make decision in participating the project and to contact their own participants. Once all the forms have been collected and signed by parents and participants, piano teachers will then trial the materials with their student with autism for twelve weeks.

Data Collection

The arrangement of observations will be made with the piano teachers before the project starts. It is anticipated that I will be visiting to observe and video-record their sessions for evaluation once a week. I will alternate between teachers, observing four sessions per week, in total twenty-four sessions for six weeks. Each teacher will receive three visits and I will stay to observe the full session, which is approximately 30 minutes. Each session will be video-recorded with a video camera mounted on the tripod. Before the session starts, the piano teacher will introduce me as the researcher to the participants so that they are aware that I will be observing. I will try to maintain a certain distance with the participants so that my presence does not impose too much on their sessions. Parents will stay in the room so that if the child shows any indication of distress, the session will be stopped immediately. If the sessions take place at school, a carer will stay in the room throughout the sessions. The reason to video-record the session is it enables me to revise the visual documentation to compare and cross reference my own observation notes, and obtain an overarching, detailed record of the observed lesson sequences.

A group meeting will then be held at the end of the first six weeks of sessions with all the piano teachers for discussion and exchange of ideas at the University of Roehampton. The group meeting is anticipated to last for four hours (10am – 3pm with an hour lunch break). A follow-

up study will then be carried out. I will visit weekly to observe their lessons for another 6 weeks to determine how they have adjusted their practice.

Data Analysis

Data will be analysed qualitatively, I will be evaluating how these teachers implement the piano strategies with observation notes. A semi-structured interview will be conducted at the end of the 12 weeks in order to complement my observation of students' progress with tutors' own assessment. The interview will last approximately 30 minutes and will take place in the piano teacher's house or in the music room at school after the observation of the last session. The interviews will enable me to uncover any challenges the piano teachers might have experienced internally while trying the piano strategies which I might missed by visual observation of their sessions. The data collected will provide evidence for improvements to the newly developed strategies. A complete questionnaire will only be available after the completion of Phase 3, a final copy will be sent to the committee once it has been completed.

References

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Yin, R. K. (2009) *Case Study Research: Design and Methods* (4th Edition), Sage Publications, Inc.

Outline of the project (continued):

Please continue on extra sheets if necessary.

Ethical issues raised by the project and how these will be addressed:

(Points that should be considered include: participants and consent; permissions from organisations involved; confidentiality and anonymity; whether any inclusion/exclusion criteria or special/ vulnerable populations are involved (including under 18s); right to withdrawal; deception; potential risks to participants or researchers)

Data collection in this project will subject to an information sheet and consent form, tailored for each group of participants. The project information sheet will outline the scope of the project, research methods and expected timeline. It will provide participants with a chance to gain an in-depth understanding of the exercise conducted, but also with an opportunity to contact the researcher and supervisors for additional information. The consent forms will outline the type of data collected, the ways it will be recorded, stored and used, and the possibility of withdrawing from the study. All data will be anonymised and confidential, and participation in the project will be subject to participants' consent. In addition, particular care will be taken when dealing with vulnerable minors. The plan below outlines the ethical aspect underlying every phase and participant group in the project.

Phase 1

Schools

I will contact the head teachers or directors of the schools formally via email regarding their involvement in the project. I will provide a written consent as confirmation of involvement as set out by Ethics Guideline 3.4(i). An information sheet detailing the intention and approach of the project will be given. (see information sheet attached)

Parents

I will be meeting with parents prior to the project to explain the research intentions and approaches of the project. An information sheet and consent form will be given to the parents with details of: aim of the project, data collection via audio and video recording, storage (see Section 6), confidentiality and anonymity of the data, the use of the data (i.e. publications and presentations) and the right of their child to withdraw from the study at anytime. (Please see the attached

consent form and video permission form)

The parents of the children will be asked to take part in semi-structured interviews before the start of the project to provide biographical details, special interest and talents, communications, behaviours, sociability and personality of their children. Upon receiving their written consent, the data provided will be audio-recorded, transcribed and used for tailoring lessons for each child.

Staff

I will be meeting with music teachers to arrange the music room and the availability of the piano. I will also meet with the carers to explain the purpose and process of the study so that they can obtain consent from the children. I will also consult the staff regarding safeguarding policies and procedures of the school so that I will conduct my sessions following the policies and procedures. The carers will also be asked to be present in all the sessions so that he/she can indicate to me whether the child is distressed and I should stop the lesson immediately. Carers will be consented in helping to film the sessions without being part of the video. A video permission form will be obtained from them in case they appear in any videos. If they agree to the terms of the consent form, they will only be interviewed prior to the start of the lessons in order to get a clearer profile of potential participating children. Assurance of confidentiality and anonymity will be given combining with the details of data storage. (Please see the attached consent form)

Children with classic autism

Children who will be participating in this current project will be within the age range of 5 to 19. According to the university ethics guidelines 3.4(J) Working with Under 18s Participants, parental consent form will be circulated to obtain permission for their children's involvement in the project. (See attached Parental Consent form).

Based on the university ethics guidelines 3.4(J), consent is required from both the parent and the young person if the project involves working with 16–17 year olds. Due to the nature of the current project, which involves children with ASD who display several learning difficulties that are unable to provide verbal and/or written, consent. As set out in BPS guideline, 'if the vulnerable person is unable to give informed consent, consent should be sought from those persons who are legally responsible or appointed to give consent on behalf of persons not competent to consent on their behalf, seeking to ensure that respect is paid to any previously expressed preferences of such persons' (BPS, 2010). However, there should be an alternative option of 'an ongoing process of assent' while involve children with autism in research (Beresford et al., 2004, p. 182-183). Several approaches will be taken for children with ASD to provide consent. An introductory meeting will take place for the researcher to explain the purpose and

process of the study to the carers. They will then be asked to gather consent where this is possible given the level of conceptual understanding and ability to convey his or her wishes from the children without the presence of the researcher so that the decision to take part will not be intervened by the researcher. To ensure ongoing consent and assent (Alderson 2004), a carer who knows the child very well will be present in the room during every session should the child indicate verbally or by any communication system that he/she would like to withdraw from the sessions. Parents will be able to withdraw their child from the sessions as well.

Before starting the project, I will read the safeguarding policies of the school thoroughly so that if at any point during the lesson, the children are feeling distressed, I will know how to act upon it such as stopping the piano lesson and filming immediately. For children with history of aggressive behaviour, I will obtain the information from the parents and teachers during their interviews and will always have a member of school staff in the room should any unforeseen circumstances arise.

I am aware of the fact that, due to working for extended periods of time in research settings with children, there may be a potential for the children to become in some way reliant on the relationship with the researcher. Ending such relationships may cause distress to the participants (Iversen, 2009) and therefore careful consideration will be required during disengagement. For this project, I will be organising a farewell and thank you concert where children will be performing to their parents, teachers and classmates, using the techniques they have learnt in lessons. I will then formally say goodbye and thank you to each of them by presenting cards. Carers will help in explaining the situation to the participants using their preferred medium of communication. By organising such an event, it will give a sense of closure for the children. However, there will be no pressure or compulsion for the children to be involved in the farewell concert.

Phase 2

Respondents

All of the videos and materials will be put on the SoI website along with an online survey to invite input of feedback and evaluation. Initially, I will advertise the project and the survey on the SoI website and their Twitter account. I will post regular reminder for users who try the materials to complete the questionnaire before the closing date. The research will be carried out according to the 'Ethical Guidelines for Educational Research' outlined by British Educational Research Association (BERA). The research process involves the principle of Voluntary Informed Consent. The online survey will be aimed at adult piano teachers and music practitioners; their participation will be purely voluntary.

All of the relevant information regarding the project, its aim and aspirations as well as the position of the researcher will be given on the first page of the survey. The contact details of the researcher will be provided for any concerned participants with additional questions. Anonymity will be guaranteed and the provision of names and addresses is once again a voluntary process should they wish to be contacted. All respondents will be given a respondent's ID number. They will be told that they are allowed to withdraw their responses at any point. All results obtained from the online surveys will be kept in a password-protected folder on a password-protected hard disk. The online surveys will be discontinued as soon as they are not being used for the purpose of this research and the respondents' responses will not be accessible by any other means.

Phase 3

Piano teachers

I will be contacting eight practitioners by putting a notice on 'SLD-forum' and other online groups. The 'SLD-forum' is a discussion group hosted by Department of Education to support professionals who are involved in the education of learners with severe, profound and multiple learning difficulties to share ideas, views and information and to encourage on-going professional development for practitioners, researchers and others concerned with the education of these learners. I will then email the piano teachers who are interested in the project regarding their involvement in the 3rd phase of the project. I will also provide a written consent as confirmation of involvement with an information sheet detailing the project plan and the confidentiality of accessing the video of their participants. Piano teachers will also be given consent forms to distribute to their participants and parents to sign prior to the start of their teaching. The consent form will contain details of the intention and approach of the project and also will also introduce my role as primary researcher. Another confidentiality consent form will be given out for teachers regarding the usage of the video data. The video data will not be used for any other purposes and will not be seen by any third party. The video samples may be used in publications and presentations with the permission of the parents. Teachers will only be able to start their teaching after I have signed and acknowledged that all the consent forms from their participants were received.

SECTION 3: RESEARCH INVOLVING PARTICIPANTS

- You should download the Participant Consent Form template and amend it as necessary
- You should also attach any other information to be given to participants
- You should consider carefully what information you provide to participants, e.g. scope of study, number of participants, duration of study, risks/benefits of the project. It is recommended that the participant has two copies of the consent form so they can retain one for information.
- If images or anything else which might allow the identification of participants is to be publicly accessible (e.g. on the web), further written consent must be secured. A separate section regarding this should be included on the participant consent form.

Give details of the method of recruitment, and potential benefits or incentives to participants if any (include any financial benefits where appropriate).
(NB: Please remember that written permission – or in some cases ethics approval – will have to be sought from any organisations where recruitment is carried out or posters placed (e.g. if you recruit in GP's surgeries you will require NHS approval)

Method of Recruitment

Phase 1

I will be contacting the Sounds of Intent team to ask for a list of special schools for children with autism that are registered with them across London and use their framework. Permission will be obtained from the SoI team prior to the recruitment. This is because the selected participants will be assessed with the Sounds of Intent framework for the musical development and not all special schools in London use it. The choice of London is due to its large and mixed demographic that will enable the researcher to access a sample drawn from a large population of children with different social, cultural and ethnic backgrounds.

Next, I will contact the schools by phone and email to ask if they are interested in participating in the music programme that the researcher is currently devising. I will approach head teachers or directors of the school

asking them to suggest potential participants from the teachers and parents. Meetings will be held to confirm participation and meet the staff. Information sheets and consent form will be given to the parents by the staff of the school.

Phase 2

I will be advertising the project and the survey on the SoI website and their Twitter account to attract professionals who are interested in the project to participate in online survey. As a professional member of Incorporated Society of Music (ISM), European Piano Teacher Association (EPTA) and Musician's Union (MU), I will request for permission to advertise the project on these websites to recruit music professionals who are interested in participating the online survey. The project is voluntary and no incentive will be given to the respondents however the developed materials will be shared with them. My aim is to get at least 100 respondents.

Phase 3

I will advertise the project on the 'SLD-forum' and other online groups (ISM, EPTA and MU). Participants will be selected based on certain criteria: they have to live in the Greater London and will be required to write a brief introduction of why they are interested in the project within given closing date. 8 piano teachers will then be recruited from the applications. They will be selected on a first come first served basis that meets all the criteria above. Meetings will be held to confirm participation, and consent forms will be given with an information sheet detailing the outline of the project.

Potential benefits:

For schools: The teaching materials that are devised during the research will be shared with the participating school. The school will be able to keep an in-depth profile of their students' musical development over the two terms.

For children: Children will receive free piano tuition from me for a period of two terms.

For parents: Parents will be able to keep the video of their child's musical development of all sessions.

For piano teachers: They will receive feedback in using the new developed materials. They will be able to keep the developed materials after the project. The results of the project will be shared with them.

Will your research involve participants who are aged under 18?

YES ☒ NO ☐

Will you be approaching participants who might be considered to be vulnerable (please give details if not addressed elsewhere on this form)?

YES ☒ NO ☐

If you have answered Yes please refer to the Ethics Guidelines (especially section 3.4.j if your research involves participants who are aged under 18) and highlight the particular issues raised by working with these participants and how these issues have been addressed.

Children with classic autism under the age of 18

A particular concern when working with vulnerable participants who are under 18 is to obtain parental consent. Children under 18 will only be allowed to participate with written parental consent. The written consent will inform them of the aim of the project, how it will be carried out, the use of videos and images, potential benefits and risks, and also protection of child anonymity. There will be explanations in the written consent form outlining that the participation of their child is voluntary and that their child can be withdrawn from the research at any point of the year. To ensure ongoing consent and assent (Alderson, 2004), a carer who knows the child very well will be present in the room during every session should the child indicate verbally or by any communication system that he/she would like to withdraw from the sessions. I will also be aware that the children may feel uncomfortable during lessons due to unpredictable circumstances. I will stop the lesson immediately should I notice any distress from the children or any indication from the carer.

University of Roehampton Safeguarding Policy

8.7 Photography and film

- Parents will be asked to sign a permission form regarding the use of videos and images of their children for publications and presentations before the start of the project. In order to protect

anonymity of the participants, parents will also be asked which footage is allowed to use for publications and presentations.

- Information will be given regarding the storage of the data, confidentiality and anonymity.

- Lesson and filming will be stopped immediately should I notice any distress from the participant during the lesson.

11-13. Child Protection Issues

I have read the guidelines according to the university's safeguarding policy (11-13.) and will follow the policy should any such cases arise. As I will be conducting the piano lessons in different schools, I will read and comply with the Safeguarding Policies of each school prior to the start of the project so that I will know whom to inform in case of emergency. I will have my mobile phone with me all the time and a contact list of a support group, so that appropriate procedures will be carried out and the right person will be contacted when needed.

DBS Clearance

Details of DBS check (date, disclosure number, issuing organisation and place of issue)

Please note: if you are unsure whether this is required, please check with Helen Joyes (HR Officer, Operations) and advise us accordingly

I have a DBS registered under Sutton and Merton Disclosure Service.

Certificate Number: 001434747464

Date: 11th February 2014

Issuing Organisation: Wimbledon College

I have been in touch with Tom Cottington in Human Resources to arrange a DBS through Roehampton.

DBS registered under Roehampton University

Certificate Number: 001518169066

Date: 3rd February 2016

Issuing Organisation: Roehampton University

SECTION 4: HEALTH AND SAFETY

- **You must download and complete the Ethics Risk Assessment Form (and Overseas Background Information Form if applicable) and attach this to your application.**
- You should be able to demonstrate that appropriate mechanisms are in place for the research to be carried out safely
- If necessary the Head of Health & Safety should be consulted before the application is submitted

Please give a brief overview of the main risks involved in the project and what will be done to mitigate against these

The current project involves vulnerable groups – autistic children aged under 18, and is thus considered as involving participants at more than minimal risk. Important considerations have been given to identifying and assessing all possible risks, and develop appropriate protocols for risk management. A risk assessment form has been filled out to address potential risks in carrying out the project:

- **Children under the age of 18**

I will adhere to safeguarding policies and health and safety procedures of each school. I will have a contact list of staff so that I will know whom to contact in the case of disclosure.

- **Cultural Differences**

I will be aware of and respect any cultural differences of the settings and participants. I will dress up and conduct myself appropriately at all times while visiting the schools. I will be sensitive to any musical preferences of participants, obtained prior to the start of the project.

- **Emotional Distress**

I will be aware that participants may feel uncomfortable during lessons due to unpredictable circumstances. Following protocols have been developed to address such issues:

1. The project will be conducted in locations in which the participants are comfortable and familiar with which is the music classroom in the school.
2. Carers or teachers will introduce me to the participants before every lesson and ask if they are happy to commence the lesson.
3. I will stop the lesson immediately should I notice any distress from the participants.
4. A member of staff will always be in the room during the sessions so that he or she can indicate to me the child is distressed or would like to withdraw from the session.
5. I will have a contact list of support groups in case of having to report any incident.

- **Infections and Diseases**

In the event of a physical assault by biting, there is a risk of infection transmission, that could include the transmission of blood-borne viruses such as HIV, Hepatitis B and Hepatitis C. It is recommended therefore that persons that habitually work with children with special educational needs receive Hepatitis B vaccination, and training on the procedures to be followed in the event of a bite that draws blood.

- **Lone Working**

I have read the university Lone Working Policy and understand that the current project falls onto medium and high risk activities. Lone working will not take place in this project. There will be carers present in the same room during the lesson. I will have my mobile phone with me at all times. My supervisors and the schools will have my phone number. I will inform them about the dates of all my visits and I will send an email before and after each visit reporting any incidents. The lessons will be pre-arranged with the school so that they know when to expect me and I will be carrying photo ID all the time during the lessons.

- **Physical attack**

I am aware that some children with ASD may pose aggressive behaviour when they are distressed and may attack me. In order to deal with such circumstances, I will first approach carers, parents and teachers of all participants to obtain information regarding aggressive behaviour in the past and procedures to take when a physical attack occurs during lessons. A member of school staff will always be present in the room during the sessions. Before starting any data collection, I will gather all the information

available in the schools about first aid procedures. I will also have a list of nearest hospitals in the area should any emergency arise.

- **Unfamiliar location with people not already known to researcher**

I will be visiting the locations prior to data collection to assess possible risks. The information obtained will be used to plan the piano sessions and also identify any back up at the location. I will be planning how and where to set up the video camera so that it complies with the health and safety policy of the school. I will make myself aware of all other policies, such as fire evacuation. I will also obtain contact details of the schools and means of making timely contact with back up, should any incident occur during the session.

Will any of your project take place outside the UK?

YES ☐ NO ☒

Country:

If you have answered yes please refer to Section 4.2 of the Ethics Guidelines, complete the Overseas Background Information form and consult with the Head of Health and Safety if necessary. Applicants should adhere to University Guidelines on Foreign Travel. If you are conducting research out of the UK but in your home country or the country in which you reside you should still complete this form.

PLEASE NOTE: it is your responsibility to contact Shamna Finnigan in Finance Department regarding travel assistance and medical cover

Please advise whether translations of participant facing documents are required, and, if so, please provide these (for student applications, these should be checked by your supervisor prior to submission)

Is this a clinical trial or a project which may involve abnormal risk to participants?

YES ☐ NO ☒

Will ‘human tissue’ samples need to be stored?

YES ☐ NO ☒

If you have answered Yes please contact the Ethics Officer who will be able to direct you to the appropriate member of staff dealing with this. Please also refer to Sections 3.3, 3.7 and 4.2 of the Ethics Guidelines.

SECTION 5: PUBLICATION OF RESULTS

How will you disseminate your findings? (e.g. publication)

Dissemination of research findings is one of the objectives of the University and therefore the research will be aiming for a professional publication in academic journals such as Journal of Research in Music Education, Journal of Special Needs Education and British Journal of Music Education.

There will also be a presentation at a conference (E.g ISM, RIME) in order to approach broad audience in music community especially music educators.

The new piano curricula framework will be available to download from Sounds of Intent website (www.soundsofintent.org) that could be shared within educators and autism community who are interested in teaching children with autism spectrum disorder piano. An example of the new piano curricula framework is provided below:

Sounds of Intent Element	Sounds of Intent descriptor	Pupil's Engagement	Teacher's Input	Anticipated learning	Success criteria
R.2.A	Shows an awareness of sounds – potentially an increasing variety	Child listens	Teacher demonstrates making a range of sounds and playing short pieces on the piano.	Comes to appreciate that the piano is capable of making sounds	Child reacts to the sounds made on the piano
				Comes to appreciate that different sounds are possible on the piano	Child reacts to the different quality of sounds that is made on the piano.
P.3.A	Intentionally makes simple patterns through repetition	Child creates simple patterns (repeated notes) on the piano with the	Support child hand over hand / hand under had to repeat notes.	That the same physical action will produce the same pitch.	Child creates simple patterns without

		help of the teacher.			physical prompt.
		Child creates simple patterns, same note up and down all octaves of the piano with the help of the teacher.	Support child hand over hand / hand under hand to repeat notes up and down all octaves of the piano.		

How will you ensure the anonymity of your participants?
(If your participants do not wish to remain anonymous you must obtain their written consent.)

An informed consent form will be signed by all primary caregivers of the participant children. In these forms, anonymity procedures will be clearly explained, as below. Additionally, two video cameras will be used during the research, one recording the facial expression of the child and other recording just the hands of the child. Parents will be asked on the consent form which video they will allow for publications and presentations of the study.

Children: Each child will be assigned with a unique ID that only I can identify. This will consist of the child's initial followed by the first letter of the school and their SOI music development level and number of the child, for example J.V.SOIL2001. All data will be kept in a personal computer, which is secure and password protected and only accessed by me at all times. The biographic details of the participants will be stored separately on a secure password-protected hard disk, and hard copies will be kept in a locked cabinet in university. The child's name will not be used in this project. Aliases will be used in all publications and presentations.

Parents and music teachers: Parents and music teachers will be given an ID code, which will be used to identify the audio-recorded interviews. This will be the ID number of the child they are giving the information for

with an added code, for instance, J.V.SOIL2001P (parent), and J.V.SOIL2001T (teacher).

Piano teachers: Piano teachers will be assigned a unique ID while filling the questionnaire, excluding the use of names or initials. Respondents will be allocated aliases in any discussion of interview data. Any information that may reveal the identity of the participants will be excluded from public discussion. Piano teachers who are involved in phase 3 will be given a unique ID, which consist of their initial followed by their teaching location, for example C.LONDON001. All data will be kept in a personal computer with secure password protected. Aliases will be used in all publications and presentations.

SECTION 6: STORAGE OF DATA

Section 2.7 of the *University of Roehampton Code of Good Research Practice* states the following: 'research data must normally be retained intact for a period of at least ten years from the date of any publication which is based upon it. Researchers should be aware that specific professional bodies and research councils may require a longer period of data retention.'

Data should be collected and processed in accordance with the Data Protection Act 1998 and with the University's Data Protection Policy.

Describe how and where the following data will be stored and how they will be kept secure:

Raw and processed data

1. Video data

Two video cameras mounted on tripods will be used for filming. Due to the potential risk of aggressive behaviour on the part of some students, it is best to have a video camera that can be attached to a still object to minimise any possibility of dropping the video camera. As soon as the session finishes, the videos will be transferred to a password-protected hard drive. Any videos on the camera will be deleted right after the transfer. This is to ensure security of carrying a camera without password protection.

As the researcher, only me and the supervisory team will have access to the videos, and the videos on the hard drive will be backed up onto another password-protected hard drive when I get home. The hard drive will be stored in a locked cabinet in university, as well as any printed material. Each video will be labelled with a unique code that only the researcher can identify. No names will be used in any of the video stored.

I will adhere to the University's Code of Good Research Practice and Data Protection Policy,

1.10.1 *Section 2.7 of the Code of Good Research Practice*

a) All the research data will be recorded accurately in a durable and audible form with appropriate references

so that it can be readily recovered. I will check the quality of the video before and after every session to ensure the data is being recorded.

b) Data analysed will be kept for a reasonable period of time, which is 10 years on the hard drive in accordance with the Data Protection Policy. The data will then be discarded so that it will not used by other researchers who might appropriate it for other purposes. The researcher will comply with the regulations of the current Data Protection Act in force to ensure that copyright, a third party's intellectual property rights and confidentiality are not breached.

The computer being used for the processing of the data is in the sole use of the researcher and is password-protected at the login and individual file level. Parents will be asked if video can be included on the SOI website (soundsofintent.org) at the end of the study. The website is a resource for parents and practitioners. Names of the children will not be included and video data will only be uploaded with permission given.

2. Case notes and Qualitative Data:

This will include data such as:

- Children's biographical detail
- Interview data
- Case notes after each piano lesson
- Coding used for analysis

This data will be kept on a password-protected file on a password-protected hard drive. Audio recordings taken from the interview will be recorded through the iPhone. These files will be extracted and kept on a password-protected hard drive. No names will be included, only ID of parents, teachers and carers will be used.

Transcribed interview data will be store in a password-protected spreadsheet labelled with ID, and no names will be used.

Documents containing personal details of any participants Documents containing personal details of participants include the EHC plan of the children obtained from the school and also permission forms from the parents. These hard copies will only be held by me as primary researcher and they will be stored in locked cabinets in university. All electronic files will not include participants' names, only ID will be used.

SECTION 7: EXTERNAL GUIDELINES, APPROVAL & FUNDING

Are there any relevant subject-specific ethics guidelines (e.g. from a professional society)? If so how will these inform your research process?

BERA Ethics guidelines for vulnerable population.
BERA is a member-led charity that exists to encourage educational research and its application for the improvement of practice and public benefit.
BERA's ethics and guidance documents provide guidelines for educational researchers who are actively conducting research in education.
This research involves vulnerable population (children with severe autism) who may be unable to provide consent, alternative ways have been taken to address such issue by obtaining consent form and approval from the parents. I will also seek collaboration from teachers to ask about alternative options to ensure valid assent from the participants throughout the data collection phase.

Has/will the project be submitted for approval to the ethics committee of any other organisation, e.g. NHS ethics approval? (Please see Section 4.3, Ethics Guidelines)

No

What is the outcome of this?
N/A

Is your project externally funded?
(Please note: you do not need to submit an ethics application or gain ethics approval for a project when applying for funding – this can be done when you receive confirmation that the application for funding has been successful)

YES ☐ NO ☒ If you have answered yes you must complete a P1 form and

submit this to RBDO before you complete your ethics application.

Please state the name of the funding organisation/ company below and provide any other relevant information:

Has your P1 form been approved by your Head of Department?

YES ☐ NO ☐

N/A

Appendix 3 – School Consent Form

HEAD OF SCHOOL INFORMATION SHEET AND CONSENT FORM

Research Project: Exploring the application of the Sounds of Intent music-developmental theory in piano pedagogical contexts for children on the autism spectrum

Brief Description of Research Project, and What Participation Involves:

This PhD research project aims to explore the use of the piano as a musical resource in promoting musical skills and wider learning development in children with autism and learning difficulties, based on the thinking underpinning the 'Sounds of Intent' (SoI) music-developmental framework. Research findings suggest that the piano might be particularly suitable to be used as a musical resource for children with autism due to its immediacy, consistency and capacity to produce multiple sounds at the same time. In order to investigate how the piano can be used effectively as a musical resource in promoting musical development among children with autism, 12 children (3 each on each SoI Level 2, 3, 4 and 5) with autism and no prior experience of attending piano lessons or having instrumental lessons will be recruited to participate in one-to-one piano lessons to test different strategies that may be appropriate at different music-developmental levels. The levels on Sounds of Intent framework are identified as musical engagement that correspond to core perceptual and cognitive abilities as shown below:

Level	Description	Core perceptual/cognitive ability
2	Awareness and Intentionality	An emerging awareness of sound as a perceptual entity and of the variety that is possible within the domain of sound.
3	Relationships, Repetition, Regularity	A growing awareness of the possibility and significance of relationships between the basic aspects of sounds – particularly repetition.
4	Notes forming Clusters	An evolving perception of groups of sounds, and the relationships that may exist between them.
5	Deeper Structural Links	A growing recognition of whole pieces, and

		the frameworks of pitch and time that lie behind them.

Research in your school

With your and the children's parents' permission, I will conduct one-to-one weekly piano lessons in your school to test different pedagogical approaches on the piano that are suitable for each music-developmental level. I will use two video cameras to record the sessions for analysis.

I hope to conduct the piano lessons for one term, from April to July 2016, a total of **12 sessions**. I will be visiting weekly and each session will last between 5-20 minutes according to the child's interest and willingness to cooperate. The day and time for the piano session will be arranged according to the convenience of the school and the timetable of the children.

Staff Involvement

Prior to the one-to-one piano sessions, I would like to conduct a short interview with the music teacher to obtain more details about the musical interests, behaviours and the personality of the participating children, in order to tailor my piano lessons to their individual needs. The interviews will take approximately 20 minutes and will be audio recorded following consent.

I would also like to ask the music teachers to watch 10% of the videos and to use the Sounds of Intent framework to assess the effectiveness of the strategies that I have implemented. The blind assessment will take approximately 30 minutes. Permission will be obtained prior to the start of the blind assessment. This can be done at the staff member's convenience. The purpose of this will be to compare how different assessors evaluate each strategy and gauge the strategies' effectiveness.

When carrying out the piano sessions, I would like a teaching assistant to remain in the room with the child during lessons for the child's wellbeing; to ensure the child is comfortable in carrying out the lessons and to assist the researcher should any unpredictable circumstances arise such and/or the child experiences emotional distress. Permission will be obtained from the teaching assistants to remain in the room with the researcher throughout the sessions.

There is no compulsion or pressure for the staff to take part in the project, and that should a member of staff decline to participate or subsequently withdraw, their treatment will not be adversely affected.

Permission and Consent

Parents will be asked to sign an informed consent form regarding their child's participation in the study and use of the videos for presentations and publications. I will be gathering demographic information from the EHC plan of the children that is kept by the school following parental consent. The purpose is to obtain details of biographical details, forms of communication, behaviours, sociability and personality characteristics of the child to help in planning the piano sessions to tailor individual needs.

Anonymity

Two video cameras will be used for video recording. One will be filming the facial expressions of the child and the researcher and another video will be filming from an angle where just the hands of the child will be seen. Any non-video data gathered, for example written case notes and demographic data, will be anonymous. The name of the school, names of music teachers and names of children will not be used in any publications or presentations.

I will be grateful if your school decides to take part in my study. You can withdraw at any time without giving a reason. Any video/photos taken up to the point of leaving the project will be destroyed at your request. However, anonymous data (for example brief written descriptions or statistical data) may still be used in collated form, from which your school, children and staff cannot be identified.

Please note: if you have a concern about any aspect of your participation or any other queries please raise this with the investigator or contact the Director of Studies. However, if you would like to contact an independent party please contact the Head of Research.

Appendix 4 – Parent Consent Form

Parent Consent Form

Promoting Learning through Piano Lessons in Children with Autism

Brief Description of Research Project:

My research aims to see how piano lessons can improve learning and social skills in children with autism. I will be visiting schools to teach the piano to 12 children with autism.

You and your child will be invited to participate in two ways:

EHC Plan

1. With your permission, I will be gathering demographic information from the EHC plan of your child that is kept by the school. The purpose is to obtain details of biographical details, forms of communication, behaviours, sociability and personality characteristics of your child to help in planning the piano sessions to tailor individual needs.

Piano Lessons

2. With your permission, I will conduct one-to-one weekly piano lessons with your child. Details are as followed:

   Term: Summer term of 2016 (April – July)
   Sessions: 12 sessions (one per week)
   Duration of the lesson: 5–20 minutes
   Time and day: This will be arranged at yours and the school's convenience, considering your child's timetable.
   Place: Music room at school

Videos of your child will be taken to keep a record of his/her response to the piano pedagogy during the lessons.

Potential benefits

Participant children will receive free piano lessons for one term (in total of 12 sessions). Results of the study will be shared with the school and parents. Videos of the lessons will be shared with the parents should you request it.

Potential risks/discomfort

As children will be conducting activities that are unfamiliar, they may feel distressed during the lessons. A teaching assistant will always be in the room with myself, the researcher, to ensure the children are comfortable in carrying out the lesson on the

day. Should any distress be noticed by any of the researcher and the teaching assistant, the lesson will be stopped immediately.

Anonymity and Confidentiality

- Your child's name will not be included in any presentations or publications related to the study.
- All information collected will be kept strictly confidential and accessible only by the researcher and her supervisory team. Individual participants will be kept anonymous and will not be identifiable in the report of the study.
- If you decide to take part, you and your child can withdraw at any time without giving a reason. Any videos taken up to the point of leaving the project will be destroyed at your request. However, anonymous data (for example brief written descriptions) may still be used, from which your child cannot be identified.

There is no compulsion or pressure to take part in the project, and that should you or your child decline to participate or subsequently withdraw, you and your child's treatment will not be adversely affected.

Please complete as appropriate and return to your school as soon as possible.

Your Name: ----------

Child's Name: ----------

DATA COLLECTION

I would like to take part in the project in the following ways:	**YES**	**NO**
The researcher is allowed to gather demographic information from the EHC plan of my child that is kept by the school.		
My child will take part in the weekly one-to-one piano lesson with the researcher during the Summer term of 2016 and can be filmed by the researcher while having the lessons.		

ANONYMITY AND CONFIDENTIALTY	**YES**	**NO**
Please **blur** my child's face in videos so that he or she cannot be identified.		
I understand that my child's name, school, and any other details that may lead to my child's identification will be		

anonymised.

I understand that if I decide at any time during the research that my child should no longer participate in this project, I can notify the researcher and withdraw my child from it immediately without giving a reason.

I understand that the data collected will be handled in accordance with the terms of the UK Data Protection Act 1998 and University's Data Policy.

I understand that, should my child leaves the project, his or her data can be destroyed as per my request.

DATA ANALYSIS AND DISSEMINATION OF RESULTS	**YES**	**NO**
I give permission for videos to be used in the following:	**-**	**-**
In presentations at conferences		
As a part of the online Sounds of Intent online resource for parents and practitioners (www.soundsofintent.org)		
I understand that the results may be disseminated at conferences, seminars and future publications, but always anonymous.		

Please read and sign if agreed:

I agree that the research project named above has been explained to me to my satisfaction and I give consent to include my child as a participant in the study. I understand what the research study involves. I have read the participant information sheet, which I may keep for my records.

Name ..... Signature .....

Appendix 5 – Teaching Assistant Consent Form

Promoting Learning through Piano Lessons in Children with Autism

Teaching Assistant Consent Form

Phase 1

Brief Description of Research Project, and What Participation Involves:

This PhD research project aims to explore the use of the piano as a musical resource in promoting musical skills and wider learning and development in children with autism and learning difficulties. It is based on the thinking underpinning the 'Sounds of Intent' (SoI) music-developmental framework. I will conduct one-to-one piano lessons weekly with 12 children during the Summer term of 2016 (a total of 12 sessions). Each lesson will last between 5–20 minutes. 12 teaching assistants with 12 children will be involved in the project.

Your participation in this research project will involve:

Piano Lessons

1. If you decide to take part, you will be requested to accompany the child in his or her weekly one-to-one piano lesson during the Summer term of 2016 (total of 12 sessions) and stay in the room while the researcher conducts the piano lesson. This is to ensure the child is not being left alone in the room with the researcher in case of any unpredictable circumstances arise and/or the child experiences emotional distress.

- All the lessons will be video-recorded. In some cases, you might be seen appearing in the videos while accompanying the child for his or her lesson. I will need consent from you regarding the usage of the video.

Potential benefits

The developed strategies will be shared with the school, teachers and parents.

Potential risks/discomfort

As children will be conducting activities that are unfamiliar, they may feel distressed during the lessons. You may be required to assist the researcher in dealing with the situation and to comfort the child.

Anonymity and Confidentiality

- Your name will not be included in any presentations or publications related to the study.
- All information collected will be kept strictly confidential and accessible only by the researcher and her supervisory team. Individual participants will be kept anonymous and will not be identifiable in the report of the study.
- If you decide to take part, you can withdraw at any time without giving a reason. Any videos taken up to the point of leaving the project will be destroyed at your request. However, anonymous data (for example brief written descriptions) may still be used, from which you cannot be identified.

There is no compulsion or pressure for you to take part in the project, and that should you decline to participate or subsequently withdraw, your treatment will not be adversely affected.

Please complete as appropriate and return to your school as soon as possible.

Name: ----------

DATA COLLECTION

I would like to take part in the project in the following way:	**YES**	**NO**
I will accompany the child in his or her lesson and stay in the room with the researcher throughout the lessons.		

ANONYMITY AND CONFIDENTIALTY	**YES**	**NO**
I understand that as lessons are video recorded, I may be visible in the recordings.		
Please **blur** my face in videos so that I cannot be identified.		
I understand that my name, place of work, and any other details that may lead to my personal identification will be anonymised.		
I understand that if I decide at any time during the research that I no longer wish to participate in this project, I can notify the researcher and withdraw from it immediately without giving a reason.		
I understand that the data collected will be handled in accordance with the terms of the UK Data Protection Act 1998		

and University's Data Policy.

DATA ANALYSIS AND DISSEMINATION OF RESULTS	**YES**	**NO**
I give permission for videos that include images of me to be used in the following:	-	-
In presentations at conferences		
As a part of the online Sounds of Intent online resource for parents and practitioners (www.soundsofintent.org)		
I understand that the results may be disseminated at conferences, seminars, and future publications, but always anonymous.		

Please read and sign if agreed:

I agree to take part in the research project named above. I have had the project explained to me to my satisfaction. I understand what the research study involves. I have read the participant information sheet, which I may keep for my records.

Name ..... Signature .....

Appendix 6 – Music Teacher Consent Form

Music Teacher Consent Form

Brief Description of Research Project, and What Participation Involves:

This PhD research project aims to explore the use of the piano as a musical resource in promoting musical skills and wider learning and development in children with autism and learning difficulties. It is based on the thinking underpinning the 'Sounds of Intent' (SoI) music-developmental framework. I will conduct one-to-one piano lessons weekly with 12 children during the Summer term of 2016 (total of 12 sessions). Each lesson will last between 5–20 minutes. Two music teachers will be involved as blind assessors in this project.

Your participation in this research project will involve:

Interview

1. You will be asked to take part in a brief interview before the start of the project, which can take place in a quiet room, during school time at your convenience. The interview aims to obtain details of the musical development, musical interests, behaviours and personality of the participant children, in order to tailor my piano lessons to their individual needs. The interview will last approximately 20 minutes and will be audio recorded.

Potential benefits

The developed strategies will be shared with the school, teachers and parents.

Potential risks/discomfort

Roughly 30 minutes outside of your working hours will be required in assessing the videos.

Anonymity and Confidentiality

- All information collected will be kept strictly confidential and accessible only by the researcher and her supervisory team. Individual participants will be kept anonymous and will not be identifiable in the report of the study.
- If you decide to take part you can withdraw at any time without giving a reason. Any recordings of interviews taken up to the point of leaving the project will be destroyed at your request. However, anonymous data may still be used, from which you cannot be identified.

There is no compulsion or pressure for you to take part in the project, and that should you decline to participate or subsequently withdraw, your treatment will not be adversely affected.

Please complete as appropriate and return to your school as soon as possible.

Name: _____

PARTICIPATION IN DATA COLLECTION	**YES**	**NO**
I will take part in a brief interview, which will be audio recorded.		
I will take part as a blind assessor to watch 10% of the videos and use the Sounds of Intent framework to assess the effectiveness of the strategies.		

ANONYMITY AND CONFIDENTIALTY	**YES**	**NO**
I understand that my name, place of work, and any other details that may lead to my personal identification will be confidential.		
I understand that if I decide at anytime during the research that I no longer wish to participate, I can notify the researcher and withdraw from it immediately without giving a reason.		
I understand that the data collected will be handled in accordance with the terms of the UK Data Protection Act 1998 and University's Data Policy.		
I understand that, should I wish to leave the project, I can request that my data to be destroyed.		

DATA ANALYSIS AND DISSEMINATION OF RESULTS	**YES**	**NO**
I understand that data collected from interviews and video assessments will be recorded and results disseminated, but I will never be identified.		
I understand that the results may be disseminated at conferences, seminars, and future publications, but always anonymous.		

Please read and sign if agreed:

I agree to take part in the research project named above. I have had the project explained to me to my satisfaction. I understand what the research study involves. I have read the participant information sheet, which I may keep for my records.

Name ……. Signature

……

Appendix 7 – Child 1

Child 1

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 17 seconds	R.2.A.2	I use the hand-under-hand technique to support the child to feel the movement of the hand playing on the piano. I play Five Little Monkeys.	The child is neither looking at the piano nor me. She seems to be distracted looking around the room. She is chewing on her toy as well. Her hand only lasts 3 seconds on my hand and then she pulls away. After 17 seconds into the song, the child wanders off from the piano.	The child is encountering the sound. However, it is unclear whether the child is attending to the sound. There are no apparent physical or emotional evidence to suggest that. She is, however, tolerating the input and physical sensation from the movement of the arms.
3.42 minutes	R.2.A.2	The teaching assistant and I attempt to get Child 1 back to the piano however it is not successful. I continue to play while the child is lying on the floor.	The child is lying on the floor and is reluctant to get up. She is chewing on her chewing toy. She gets upset when we try to get her up.	It seems that the activity is very new to the child and she does not seem to be understanding what is happening. I acknowledge that the child needs more time to be familiar with the session and me, therefore, I continue to play even when she is not attending to the sounds.

7.45 minutes	R.2.A.1	I provide a wide range of listening experiences for the child. First, I play the child's favourite nursery songs to motivate the child. The songs are: Let it Go, Five Little Monkeys, If you happy and you know it, Twinkle twinkle little star, Bonnie Lies Over the Ocean. I stop for 4-5 seconds in between songs to see if the child reacts. I then make a series of sound. First, rapid high register notes to portray bird-chirping sound to stimulate the child. And then I play low register rapid notes to portray 'thunder' sound to contrast the previous sound. I then continue to play individual notes on the piano. First slow individual ascending white keys note and then descending white keys followed by ascending black notes and then descending black notes that contributed to the pentatonic scale. These sounds are made randomly in order to provide a wide range of sounds for the child to experience and in the hope that the child will react to one of these sounds.	Throughout the event, Child 1 is just lying on the floor chewing on her toy. No physical or emotional evidence are observed.	Although the child may seem not to be engaging, she might be listening unconventionally (internalising the sound while she is lying on the floor). As discussed by Bogdashina (2003), some children with ASC use the preconscious (indirect) system to take in information which they use their senses peripherally. This allows them to take in a significant amount of information through they are 'absent' from the process. For instance, the child does not seem to be listening however she might be listening to the music indirectly.

2 4 seconds	R.2.A.2	Material from the last session is used (see Strategy 2 Session 1 R.2.A.2). I start playing rapid notes on the high register to portray bird-chirping sound. I start with high and rapid sound in hope to stimulate a response from the child.	Child 1 is looking downwards and chewing on her toy.	The child is feeling unsettled and moving around. She is unable to tolerate to have her hand resting on my hand and therefore hand-under-hand technique cannot be applied in this event. I continue with Strategy 1 (see below).
8 seconds	R.2.A.1	I first start with playing rapid high register note. This is due to the child is sitting at that end of the piano. I decide to play near to the child in order to stimulate a response from her. I manage to go after her and get her up on the chair again.	The child comes in with her chewing toy. When the class teacher and I try to take the toy away, she vocalises in distress and reluctant to let go. The child is looking at her chewing toy. She is neither looking at me nor the piano when I play on the keys that are right in front of her. After 8 seconds, the child climbs down from the chair and wanders off and lies on the floor.	The child is encountering the sound however it is unclear if she is attending to the sound. It may due to her being distress before coming to the session that distracts her.
16 seconds	R.2.A.1	I continue to play high sound however this time with just individual notes. Ascending and descending of black keys. I try to engage her by calling her name and continuously engage in eye contact in hope to direct her attention to the piano and me.	The child is unsettled and is not sitting on the chair. She is standing, and her back is facing me. She is chewing at her toy and looking somewhere around the room. After 16 seconds, the child wanders off and lies on the floor again.	The child is encountering the sound but no evidence to suggest that she is attending to the sound.

30 seconds	R.2.A.1	I decide to play Twinkle Twinkle Little Star on the high register where the child is facing.	Halfway through the song, the child makes eye contact with me.	The child starts to engage in eye contact perhaps because I am constantly looking at the child to direct her attention.
18 seconds	R.2.A.1	I decide to play a contrasting sound, loud and low in hope to stimulate a response from the child.	The child's back is facing me. When I play rapid notes on the low register, after 5 seconds, the child slowly turns her back and looks at the direction of the playing. She is looking at my hand playing on the piano. Child 1 then wanders off again and lies on the floor.	The fact that the child turns her attention to the source of the sound indicates that she may start to realise the sound is coming from the piano.
34 seconds	R.2.A.1	I decide to stand behind the child to prevent her from wandering off again while I play high sound on the piano.	The child is neither looking at me nor the piano. She is chewing on her toy.	Encountering sounds but not attending to them.
6 seconds	R.2.A.1	Once I settle down the child to sit on the chair, I start playing Five Little Monkeys. I have to stop to prevent her from chewing the music score.	Eight seconds into the song, the child grabs my score and starts chewing it.	The child is feeling unsettled at this point. She is continuously browsing around to grab something at hand to chew.

16 seconds	R.2.A.1	I decide to continue to play Five Little Monkeys again.	The child is neither looking at me nor the piano. She is just chewing her toy. Her back is still facing me.	Encountering sounds but not attending to them.
11 seconds	R.2.A.1	I decide to move closer to the child and play a high sound to attract the child's attention as she is facing right in front of the keys.	The child does not look at the piano keys but staring straight at the room while chewing her toy.	
1.03 minutes	R.2.A.1	I continue to stimulate the child's listening experience by playing high sound.	With the chewing toy now taken away, the child directs her focus on the piano. When I start playing on the piano, she wiggles her fingers and starts to knock on the piano. She then looks up and makes eye contact with me. However, she then starts to push me away.	The wiggling of the fingers suggests that the child may be imitating the movement of my fingers playing on the piano. She then interacts with me by knocking on the piano. It is unclear what is the intention of the knocking. She also makes engagement through eye contact. Joint attention is the notion here that the child and I are attuned into each other engage in the similar activity.
30 seconds	R.2.A.1	I continue to play high sounds on the piano.	The child starts to look at me and smiles.	The child is beginning to attend to the sounds I play.

			The child looks down on the floor and then up again looking at me.	
20 seconds	R.2.A.1	Since the child has not responded much to the high sound of the piano and she seems to be more settled. I decide to play Twinkle Twinkle Little Star to observe the child's reaction.	The child is just looking at the class teacher and smiles.	The situation is slightly distracted to the child as there are two people involved in the session. The class teacher distracts the child's attention.
20 seconds	R.2.A.1	I decide to play only single pitches to observe if the child reacts to the sound.	The child is looking somewhere in the room; her back is facing me. After 11 seconds, the child slowly turns her back to me which is the source of the sound. She makes eye contact and smiles at me. However, she then starts to push me away.	This is the second time the child tries to push me away during the session. This may be her gesture to indicate that she does not like the sound or she is feeling unsettled and distressed.
4 seconds	R.2.A.1	I continue to play single pitches, ascending pentatonic (F#, G#, A#, C# and D#). I then implement another strategy to help the child in realising the sound is coming from the piano.	The child is now looking at the piano keys.	The child starts to attend to the source of the sound by looking at the keys.

15 seconds	P.2.A.1	I hold the child's hand to press down the keys. As I have already started with the pentatonic scales, I decide to use the same material and press down ascending pentatonic scale.	The child tolerates the input and she is looking at the piano while I hold her hand to play on the piano. When I let go of her hand, she wants more by grabbing my hand to the piano.	When I let go of the child's hand, the child starts pressing down the keys using her palm. This shows that the child understands the mechanism of the piano that when you press the piano keys, the sound comes through. The child wants more by grabbing my hand towards the piano. See below.
3 seconds	R.2.A.2	I play five single notes on the piano. Ascending pentatonic (F#, G#, A#, C# and D#)	The child grabs my hand towards the piano to indicate me to play again while she rests her hand on my hand to feel the movement. When I stop, child 1 looks up at me and smiles for 4 seconds.	It is the first-time child 1 initiates an interaction by grabbing my hand towards the piano to tell me to play. This physical evidence suggests that the child has started to realise that the piano is capable of making sounds. To reaffirm that the sound is coming from the hand playing on the piano keys, she grabs my hand to tell me to start playing. Moreover, another physical evidence shows that the child realises that the piano is capable of making sound through smiling.
4 seconds	P.2.A.1	I try again by holding the child's hand to press the piano keys.	The child tolerates the input and starts to push me away.	The child starts to feel a little distress; perhaps she dislikes the sensation of touching my hand or she is feeling

				tired.
27 seconds	P.2.A.1	I decide to try again. I hold the child's hand and press the piano keys.	The child tolerates the input and she is looking at her hand which I am holding to press down the keys. When I let go of her hands, she does not push down the keys however she put her hand on the keys.	It seems that the child is 'feeling' the keys with tactile input.
27 seconds	R.2.A.1	As the child pushes my hand away, I decide to continue to stimulate the child by playing the pentatonic scales.	The child looks at my hand. She then vocalises throughout while I am playing.	It is unclear what is the intention of the vocalisation however this shows that the child might be attending to the sound made on the piano. The vocalisation is an expression to show her excitement.
31 seconds	R.2.A.1	I decide to play Five Little Monkeys again to the child.	The child starts to move her body with the song. She then looks at me and smiles. She also looks at my hand while I am playing.	It shows that the child has a fondness on this song when she immediately rocks her body with the song when I play on the piano. Halfway through the song, the child looks up at me and starts smiling. Such interaction shows that the child is acknowledging me that she recognises the song and she knows I am the one playing on the piano as she looks at my hand playing on the

				piano after she looks at me.
3 1.54 minutes	R.2.A.1	I start to play one of the child's favourite songs: Let it Go.	The child is chewing on her toy. 30 seconds into the song, the child looks up at the piano and then down again on her toy. 10 seconds later, she looks up at the piano again and turns away. After 17 seconds, the child looks at the piano again. She then starts to knock on the piano.	The child looks up to the piano can be interpreted as she starts to realise the source of the sound is coming from the piano. It is unclear what is the intention behind the child's knocking on the piano. It can be interpreted as the child is aware that the piano is capable of making a sound however she has no idea 'how' or in what way to produce the sound and therefore she is using her way to 'play' the piano.
1.30 minutes	R.2.A.1	I play another song to observe if the child reacts differently. I play Bonnie Lies Over the Ocean.	After 25 seconds, the child starts to move her body and put her leg on the piano. She then starts to vocalise in distress and starts crying.	At this instance, it is unclear what contributes to the child's distress. It may be because she dislikes the song. It can also be that she loses her attention and wants to wander off.
55 seconds	R.2.A.1	I decide to play a tune that is in contrast to the previous soothing and calm song. I decide to stimulate the child with a slightly more rhythmical and agitated song: Gummy Bears which contains rapid, low chords and semiquavers melodies.	The child shows no physical or emotional evidence to the song. She is chewing on her toy.	It seems that the child is listening to the music however it is unclear if she is attending to the sound as no evidence are shown.

34 seconds	P.2.A.1	I hold the child's hand to press down the keys.	The child tolerates the input. She looks at the piano while I am holding her hand to play on the piano. When I let go, she put her hand on the keys seems like she is attempting to press down the keys however due to the weakness of her fingers, no sound is being made on the keys. She then starts to knock on the piano.	At this stage, I am just helping the child to make a sound on the piano as the child is new to the piano and has no knowledge of the mechanism of the piano. The fact that the child knocks on the piano after I let go of her hands may due to her unsuccessful of making sounds on the keys due to the weakness of her fingers. I observe and decide to support the child to press on the keys again. When I do that, the child starts smiling when the sound comes through the piano. From her expression, I assume that the child is aware that the sound comes from pressing down the keys and how the piano works.
34 seconds	P.2.A.1	I continue to help the child to press down the keys. It is ascending pentatonic scale that the child has listened before.	The child tolerates input and looks at the piano while we play on the keys. When I stop and cue her to play, instead of pressing down the keys, she starts to knock on the piano keys.	This can be interpreted as Child 1 is aware that the piano is capable of making sound and the sound comes through from the piano keys however she has no idea 'how' to produce the sound from the piano. Moreover, given that her fingers are weak, this may contribute to her seeking other ways to 'play' the piano. This may be her interpretation of 'playing' the piano – knock.

				I decide to hold Child 1's arm to press down the keys; this is to show her the strength can come from the arm pushing down the keys. When I let go of Child 1's hand, she raises her hand and drops them on the piano however due to her weak physical strength; she only manages to make a very quiet sound. I observe and after 7 seconds, the child covers her ears and starts vocalising in distress. I interpret this as sensory overloading.
15 seconds	R.2.A.1	I then play Twinkle Twinkle Little Star. I repeat by playing and singing the song at the same time	Two seconds into the song, the child leans on the piano and starts to vocalise. She then holds my hand to feel the movement.	Child 1 reacts to the song may because she recognises the song. It can also be interpreted that the child starts to realise the sound comes from the piano thus leading her to take on a more proactive role which she holds my hand to feel the movement.
1.19 minutes	R.2.A.2	I play and sing Twinkle Twinkle Little Star for the child. When the child pulls her hand away from the piano, I stop to reaffirm that the sound is coming from the piano.	The child is now holding my hand to feel the movement. Halfway through the song, she pulls my hand away from the piano and then back again. I play the material twice. This happens five times throughout the event. In between, the child makes eye contact and smiles	The child takes on a more proactive role after the last two sessions. This may due to the child is now comfortable with the session and me. The child starts to gain realisation that it is the hand playing on the keys that contribute to the sound-making of the

			when I play the song. When the song finishes, the child starts knocking on the piano.	piano. To reaffirm this, she starts to take on a more initiative role by controlling my hand movement. However, it is unclear that the child's reactions such as smiling and making eye contact are responses to the playing or singing. Therefore, the next stage will be to play without singing to observe if the child has a similar reaction. Also, it is unclear what is the intention behind the child's knocking on the piano. It can be interpreted as the child is aware that the piano is capable of making sound however she has no idea 'how' or in what way to produce the sound and therefore she is using her way to 'play' the piano.
1.15 minutes	R.2.A.1	I play another song that the child has previously listened to I Can Sing a Rainbow.	Five seconds into the song, the child looks at me and then to the piano. She then starts knocking on the piano. She continues to chew her toy after.	I continuously use repetitive and familiar materials in the sessions to assist the child in developing her listening experiences. Through the evidence shown from the child, one can determine that the child's awareness that the piano is capable of making sounds has emerged.

1.05 minutes	P.2.A.1	As the child is already listening to Twinkle Twinkle Little Star I play, I decide to hold Child's hand and support her to play the song by pressing the keys down.	The child tolerates the input throughout. She is also looking at the piano while we are playing but mostly looking at me.	It is clear to me that the child is now concentrating in looking at the production of the sounds on the piano as she is chewing her toy before I hold her hand and press the keys. When I do that, the child stops immediately and tolerates the input and looks at the piano occasionally but generally looking at me.
2.25 minutes	R.2.A.1	(a) I play If You Happy and You Know It. It is one of the child's favourite songs. According to the class teacher, she will flap her hand in excitement when they put the song on YouTube in the class. (b) I decide to play again. I play the song again.	(a) Four seconds into the song, the child starts to rock her body with the song and starts smiling. When I stop, the child stops as well. (b) The child starts to move her body back and fro and starts smiling again. The child then stops and looks at the piano. When I stop, she looks at me and starts vocalising. The child starts to rock her body and smiles again. She then stops and looks at me and smiles throughout the song.	The child rocks her body with the music may due to that she gains realisation of the sound and starts to react more actively. The child rocks her body with the music can be explained with early years music and movement which Moog (1968) explained that from around the age of 6 months, babies would typically move spontaneously to music. This corresponds closely to Sounds of intent element I.2.A – 'sounds made by another stimulate a response in sound' and therefore, it is reasonable to expect spontaneous movement to music from the child. Moreover, Clayton, Sager and Will (2004) described the formation of regular pulse in the mind of the listener that is cognitively and

				physical synchronised with movement are through the process of 'entrainment' which pulses interact so the movement occur at the same rate. The fact that the child vocalises only when the music stops but not when the music is playing, this can be explained as music babbling (Moog, 1976). Music babbling is usually elicited during or immediately after the presentation of music however music babbling does not yet reflect the characteristics of the musical repertoire to which the child is exposed. Moreover, the child does not vocalise and rock her body at the same time; Ockelford (2013) provides a potential explanation for this phenomenon. In the early stages of music development, listening to sounds can induce attendant vocalisation however to produce coherent streams of sound simultaneously is a more advanced stage (Level 5 Sounds of Intent), which involves switching attention rapidly between the two.
1.18 minutes	R.2.B.1	I decide to expand the child's listening	No emotional and physical evidences	The child seems to acknowledge I am

		experience by introducing different dynamics and tempo. First I play quietly on the piano, and then slowly. I then combine quiet and slow. I then contrast the previous playing by playing loud and fast.	during the first half of the playing. The child is looking at me. When I play loud and fast, the child bursts into laughter.	playing on the piano as she is looking at me throughout the event. For the first half, there are no reactions observed. I assume that the child does not recognise the differences. When I play the contrast, the child burst into laughter. This seems that the child is able to recognise the contrast between the two. Or the child likes music that is played loud and fast.
4 38 seconds	R.2.A.1	I play If You Happy and You Know It as the child reacts fondly from the previous session.	The child is moving around.	The child is feeling unsettled and wants to climb down from the chair. Perhaps she is dealing with the transition.
40 seconds	R.2.A.1	I then proceed to play Twinkle Twinkle Little Star, a more soothing and calm song to calm the child down.	The child looks at the piano and vocalises when I stop.	Despite spending some time to settle down, the child immediately recognises the song played on the piano. She engages through looking at the piano where the actions took place and vocalises when I stop. The vocalisation can be explained as music babbling or the child is communicating to me that she likes the song.

26 seconds	P.2.A.1	I hold the child's hand to create sound on the piano.	The child tolerates the input. After about 10 seconds, she starts to vocalise and rocks her body forward and backwards.	It is difficult to deduce the reason that triggers the child to vocalise. When I let go of her hand, she rocks her body forward and backwards with vocalisation while trying to press down the keys. I interpret this as delay in processing.
39 seconds	R.2.A.1	Once the child seems to settle down, I play another favourite's song for the child: Five Little Speckled Frog, a more rhythmical and upbeat song to stimulate the child.	The child looks at the piano but then starts to knock on the piano.	It is still unclear what is the intention behind knocking of the piano. I assume the child recognises the source of the sound and would like to join in however she has no idea how to make the sound.
35 seconds	P.2.A.1	As I realised from the previous session, the child has weak fingers and it is difficult for the child to produce sound on the piano with the execution of individual fingers. I then hold both her hands and push down the keys using her palms. I exaggerate the movement by lifting the child's hand higher and then push down the keys. This is to show the child sound can be made through lifting your arm and push down the keys.	The child tolerates input and is constantly looking at the piano while we are playing. When I let go of her hand, she lifts her hand and pushes down the keys.	I interpret such an attempt as the child has now understood that such movement can create sound on the piano.

10 seconds	R.2.A.1	I play pentatonic scales again on the piano.	She is looking and smiling at me while I am playing.	The child is encountering sound, it seems that she is attending to the sounds and this is shown through her facial expression and her making eye contact with me.
12 seconds	R.2.A.2 I.2.B.1	The child then starts to hold my hand to feel the movement. This turns into an interactive 'game' between the child and I.	The child tolerates input and when I stop, she will grab my hand and controls my hand movement to play on the piano.	The child takes on a proactive role by grabbing my hand and interacts with me. She is controlling my hand movement. First, she pulls my hand away from the piano and then back again to indicate me to play. The child is now feeling comfortable with me and she seems to enjoy the task.
5 seconds	P.2.A.1	I hold the child's hand and press down the keys again but this time with individual fingers.	The child tolerates the input.	The child only tolerates for 5 seconds and wanders off. I assume that the child is getting tired or loses her attention.
15 seconds	R.2.A.2	I Head, Shoulders, Knees and Toes while the child rests her hand on mines.	The child tolerates the input and smiles when I am playing. She then vocalises when I stop.	The child recognises the sound from the piano when I play and she shows her awareness through facial expression: smile. Vocalisation can be

				explained as music babbling or showing fondness to the song.
1.05 minutes	R.2.A.1	I decide to play a new repertoire to the child in order to observe if the child is responding due to the familiarity with the songs or she is reacting to sound made on the piano. I play Fur Elise.	The child occasionally looks at the piano and me however most of the time she is browsing around. She then vocalises again when I stop and starts knocking on the piano.	It seems that the child is reacting to some of the songs that she knows as the evidence suggest that the child is not attending to the sound while I play Fur Elise (at least not most of the time). Knocking on the piano can be explained as trying to mimic my playing to create sound on the piano.
54 seconds	P.2.A.1	I hold the child's hand and make a sound on the piano again.	The child tolerates the input and smiles. She looks at the piano occasionally and then starts vocalising throughout.	For the first half, I am just pressing random keys. There is no emotional evidence from the child. I then decide to play Twinkle Twinkle Little Star by holding her hands. The child immediately recognises the song when she smiles and looks at me. She then vocalises throughout the song as if she is trying to sing. When the music stops, she stops vocalising as well. This is an early indication that the child is engaging in an activity together with me. Joint attention is the notion here.

40 seconds	R.2.B.1	I continue to expand the child's listening experience by making a range of different sounds on the piano. I play low and high sound alternatively with 5-6 seconds wait in between.	First, no evidence shows the child recognises the difference of sounds. However, when I stop, the child looks at me and pulls my hand to the low register of the piano. She smiles when I start playing.	I allow sufficient time for the child to respond between the sounds. I acknowledge the child is aware that the piano is making sounds when she looks up at me when I stop playing. Twenty-seven seconds into the action, when I stop playing, the child pulls my hand towards the low register of the piano and smiles when I start playing. This happens three times. Here, I interpret that the child now has some knowledge on the different range of sounds that can be made from the piano as the child pulls my hand towards the sound she likes or wants to hear.
15 seconds	R.2.A.2	I play five single notes on the piano. Ascending pentatonic (F#, G#, A#, C# and D#) which I play to the child in session 2.	The child tolerates the input and smiles while we play. She also vocalises while we are playing.	It may be that the child is familiar with the material now and reacts positively to it.
18 seconds	P.2.A.1	I hold Child 1's hand to make some sounds on the piano.	The child tolerates the input. She smiles and vocalises at the same time.	From the child's expressions, I assume the child likes the activity as she is vocalising and smiling throughout. She also tolerates the input throughout the event.

34 seconds	P.2.A.1	I hold Child 1's hand to play on the keys again.	The child tolerates the input. She starts to laugh when I hold her hand to press down the keys. When I stop, she pulls my hand to the piano 'asking' for more.	It seems that Child 1 likes the activity of producing sound on the piano. Here, I interpret that Child 1 starts to be more proactive and engaging although she has yet to create sounds on the piano intentionally. There may be an explanation for this, this may be due to her weak motor skills and physical strength and therefore she seeks support from me to produce the sound on the piano instead of doing it on her own.
32 seconds	R.2.B.1	I decide to play high and low sounds that she has exposed the child to.	The child laughs when I play high sounds but no physical or emotional responses when I play other sounds.	It is interesting to see the child's reactions to different sounds. The child starts laughing when I play high sounds but no reactions are observed when I play low sound. I assume that the child starts to gain recognition that the piano is capable of making a different range of sounds and she prefers high sounds. Alternatively, perhaps she is just pure reacting to the sounds.

5 36 seconds	R.2.A.1	I start playing simple high sound on the piano where the child is sitting. I then stop and observe the child knocks on the piano.	The child starts to knock on the piano immediately when I start playing on the piano and continuously for more than 10 seconds.	The child knocks on the piano even though I am not playing. It seems that the child is imitating my actions or tries to make a sound on the piano in her way.
23 seconds	R.2.A.1	While the child is knocking on the piano, I decide to make sounds on the piano again to observe if the child will be aware of the sound.	The child looks at the direction where I am playing for about 11 seconds and then continue to knock on the piano.	The child immediately looks up to the direction where I am playing and looks at the piano keys. This is a sign that the child realises the source of the sound and is able to react quickly to the source of the sound.
23 seconds	P.2.A.1	I hold the child's hand to press down the keys.	The child only tolerates the input for 10 seconds and she pushes me away. When I try again, the child turns her head and looks at me and starts smiling.	Here, I interpret that the child recognises that the piano is capable of making sounds however she has no intention to create sounds.
46 seconds	R.2.A.2	I apply hand-under-hand technique and make sounds (single pitches) on the piano.	The child tolerates the input and looks at the piano occasionally. She laughs from time to time as well.	Child 1 is now able to tolerate the input longer (her hand rest on mine or holding my hand). This may occur due to the child gains confidence and is familiar with the structure of the session and me.

1.03 minutes	R.2.A.1	While the child is knocking on the piano, I decide to make sounds on the piano to observe if the child will be aware of the sound.	The child immediately looks at the piano keys and continue to knock on the piano.	The child immediately looks up. This is a sign that the child realises the source of the sound and is able to react quickly to the source of the sound.
29 seconds	R.2.A.1	I continue to make sounds on the piano, playing single high pitches on the piano.	The child looks at the piano occasionally and smiles. She then joins in with me by knocking on the piano.	Joint attention is the notion here. The child is aware of the sounds made on the piano and starts to engage on the task with me by knocking on the piano.
29 seconds	R.2.A.1	I decide to introduce a new sound on the piano. Low sound.	No physical or emotional evidence.	The child stops all her actions. It seems like she is listening to the song. The child's attention has now directed to attentive listening to the new song.
27 seconds	R.2.A.2	I play Five Little Monkeys for the child.	The child tolerates the input and starts to rock her body with the music.	Child rocks her body with the music and stops when I stop. This phenomenon is discussed above (see Session 2).
42 seconds	P.2.A.1	Again, I exaggerate the movement of holding the child's hands and press down	The child tolerates the input.	When I remove her support, the child rests her hand on the piano. This may

		the keys using palms.		due to delay in processing the information or she has no intention to create sounds proactively.
26 seconds	R.2.A.1	I continue to play a pentatonic scale on the piano.	The child looks at the piano and starts knocking on the piano.	When the child encounters sound from the piano, she immediately acknowledges by turning her head and looks at the piano.
46 seconds	R.2.A.1	I play Radetsky March again, using an upbeat tune to motivate the child.	No emotional or physical evidence are shown when I am playing. When I stop, she starts to knock on the piano. When I play the repertoire again, she starts to rock her body with the music.	Rocking body with the music suggests an acknowledgement of encountering and attending to sounds. The intention of knocking on the piano is yet unknown.
39 seconds	R.2.A.1	I start to play Fur Elise again that I introduced earlier in the session.	The child looks at the piano and occasionally at the researcher. She laughs from time to time.	It seems like the child recognises the song and reacts fondly towards it.
7 1 minute	R.2.A.1	I play five single notes on the piano. Ascending pentatonic (F#, G#, A#, C# and D#). I use repeated materials.	The child wiggles her finger before knocking on the piano as if she is trying to imitate the action of the researcher.	I use repeated materials due to children with ASC have a fondness of repetition and they are seeking regularity and consistency (Ockelford, 2013; Schott,

				2017).
35 seconds	R.2.A.1	I play Five Little Monkeys twice with singing to stimulate a response from the child.	When the child hears the song, she immediately moves her body with the music.	At this stage, I am convinced that the child is aware of the sound however it is uncertain whether the child is reacting to the singing or the piano sound. Therefore, I play again but without singing this time.
44 seconds	R.2.A.1	I play Five Little Monkeys twice again but without singing.	The child moves with the music and smiles. She vocalises when I stop.	It is now clear that the child is reacting to the music played on the piano. She shows her excitement through vocalisation when the music stops.
20 seconds	R.2.A.1	I play Five Little Monkeys again without singing to observe the child's reactions.	The child moves her body with the music and continues to rock her body even when the music has stopped.	The child continues to rock for another 5 seconds even the music has stopped. This may due to delay in processing.
1.12 minutes	R.2.A.1	I play another nursery song that the child has listened before: I'm a Little Teapot twice.	The child shows no reactions when I play. She is just sitting on the chair looking around.	No physical or emotional evidences are shown here. This may due to the child is not fond of the song or it may due to she is listening attentively. It is unclear at this stage.

1.07 minutes	R.2.A.1	I change the song to If You Happy and You Know It as the child reacts fondly the last session.	The child rocks her body with the music and smiles.	I provide ample time for the child to react. The child constantly rocking her body with the music and when the music stops, she stops at the same time and stars vocalising. This phenomenon is discussed earlier (see Session 2 and 4).
1.26 minutes	R.2.A.1	In order to reaffirm the child is reacting to the sound on the piano and not the songs itself. I play single pitches on the piano however the pitches are not randomly chosen. It was the black keys (pentatonic scale) that the child experienced before. However, I improvise and play a short excerpt using only these notes. I increase the volume towards the end of the excerpt.	The child moves her body with the sounds and bursts into laughter when I play loudly and quickly towards the end.	The fact the child rock back and fro when she heard the sound from the piano suggests that she is aware that the piano is capable of making sound and shows appreciation through body movements and facial expressions. She bursts into laughter when she hears me played rapid trill loudly on the piano suggests that she is gaining awareness of the different dynamics that the piano is capable of making. Her keenness to participate shows when she tries to press the piano keys when I stop.
45 seconds	P.2.A.1	I hold the child's hand and press on individual keys.	The child tolerates the input throughout and she pulls her hand away and starts to knock on the piano.	The child seems to enjoy the activity with high tolerance with the input for an extended period. Perhaps she is feeling comfortable with me now and that she is keen to create sounds

				(knocking on the piano).
26 seconds	R.2.A.1	When the child pulls her hand away, I decide to continue to stimulate the child with pentatonic scale again. She improvises with the pentatonic scale.	The child looks at me and smiles.	She encounters the sound and acknowledges this by looking at me and smiles.
31 seconds	P.2.A.1	I hold the child's hand again and press down individual keys.	The child tolerates the input and smiles. She vocalises when I stop.	It seems like she is intentionally creating sound but using her voice to imitate the sound of the piano. Or she is communicating that she wants more.
34 seconds	R.2.A.1	I continue to provide broad listening experience to the child. I improvise on the pentatonic scale again.	The child starts to rock her body with the music. She vocalises again when I stop.	This shows that the child is attending to the sound and perhaps recognises it is the pentatonic scale that she encounters before. Vocalisation – may due to the excitement.
50 seconds	R.2.A.1	I decide to play an unknown song to the child to observe if the child will react to the song. The song consists of a regular beat and repetitive materials: Radetsky March.	At first, the child shows no reactions. She then starts to rock her body with the music. When I stop, she stops as well.	It seems like she is listening attentively to the music at first before joining in. Child 1 rocks her body, whenever sound is being made on the piano, shows that she is aware of the sound however it seems that her preference

				for songs or sounds is still undeveloped at this point.
8 50 seconds	R.2.A.2	I play Five Little Monkeys twice.	The child tolerates the input and smiles. She also rocks her body back and fro with the music as well.	The child continues to rock when I stop - delay in processing. Gain recognition of the sound and song through her body movements and gestures.
49 seconds	R.2.A.1	I play ascending pentatonic notes on the piano again. Repetitive materials are used here.	The child rocks her body with the sounds however only lasted about 10 seconds. She then starts to move around, looking unsettled.	This may due to the fact that the class teacher told me she is unwell and parent has reported that she did not sleep well the night before. Even so, it is clear that the child recognises the material when she rocks her body to the sound.
27 seconds	R.2.A.2	I play ascending pentatonic pitches Halfway through the playing, Child 1 holds my hand to feel the movement.	The child only tolerates the input for about 5 seconds however she starts to hold my hand to feel the movement instead of resting her hand on mine. She also looks at the piano occasionally while we are playing.	The child starts to be initiative, more proactive.

34 seconds	R.2.A.1	As the child is feeling unsettled, I decide to stimulate the child with a few nursery songs. These are the songs that the child has listened previous - Five Little Speckled Frogs and Head Shoulders Knees and Toes.	The child shows no reactions although she will occasionally look at me.	It is crucial that repetitive materials are used as children with ASC have a fondness in repetitive music listening (Turner, 1999). Moreover, according to Scott (2017), children need opportunities to listen to the same selections of songs so that the music becomes part of their known repertoire. One can assume that the child is tired or unsettled at this point even though she is encountering the sound however she is not attending to it.
27 seconds	R.2.B.1	I continue to provide contrasting sounds experience for Child 1.	The child flaps her hand vocalises loudly when I play a series of chords on low register. However, when I play again, no reactions are shown. When I change to play high sounds, she vocalises and smiles at me.	The child is encountering the sound and attending to it but with a short period. She then realises the difference of sounds when I play high sounds where she vocalises and looks at the researcher with a smile.
23 seconds	R.2.A.1	At this stage, I somewhat establish the child's preference in song. I play Five Little Monkeys again.	The child moves her body with the music when she hears the song however only lasts for 8 seconds. When I stop playing, she starts to vocalise.	The child does not rock throughout the music, this may due to the fact that she is internalising the sound and listening to the music attentively. Vocalisation – music babbling or perhaps communicating with me that she likes the song or she wants more.

26 seconds	P.2.A.1	I support Child 1 to create sound on the piano again using palms.	The child tolerates the input and vocalises when I stop.	It seems that she is trying to imitate sound from the piano as she vocalises when I stop. The child seems to enjoy using palms to press down the keys as opposed to individual fingers as she is reluctant to continue and only tolerates the input for 3 seconds when we play using individual fingers but she is able to tolerate longer when we play using palms.
30 seconds	R.2.A.1	I repeat the song Five Little Monkeys again.	The child moves her body with the music and smiles. She will look at me occasionally seems like 'telling' me that she is enjoying the song. She vocalises when I stop.	It is now clear that the child is responding to the music.
27 seconds	R.2.B.1	I decide to play high sounds on the piano to observe the child's reactions.	The child looks at me and starts vocalising while I play. She then starts to knock on the piano again.	The child starts to gain recognition which shows through her expressions: vocalisation. She takes on a more proactive role now by knocking on the piano again. Perhaps this is her way of creating sounds.

46 seconds	R.2.A.1	I play another song 'Let it Go' to the child. I demonstrate listening by putting my ear near to the piano.	The child briefly looks at me and at the piano and then she starts to look around the room again.	When I demonstrate putting my ears on the piano, the child does not react or imitate; there are several potential explanations on this. As Rogers et al. (2003) discussed, children with ASC experience difficulties in imitation and reproduced the behaviours of a model. The ability to imitate is associated with the development of language, play and joint attention (Ingersoll & Schreibman, 2006) which was one of the deficits of children with ASC. Therefore, while I am demonstrating the gesture, child 1 does not imitate. Second possible explanation on this may be due to the attention of children with ASC. As discussed by Bogdashina (2016) and Frith (2003), children with ASC are selective when it comes to the attention of stimuli. Children with ASC may attend to what he or she thinks is important and only focus on one stimulus. As child 1 is already attending to the sound played on the piano, she may have difficulty in attending to what I am doing.
15 seconds	P.2.A.1	I hold the child's hand and press the keys using palms again by exaggerating the	The child tolerates the input and	It seems that she is imitating the sound

		movement of the hands.	vocalises at the same time.	on the piano through vocalisation.
20 seconds	R.2.B.1	I play low sounds again to stimulate the child.	She starts to move around when I was playing. It seems like she wants to wander off again. When I stop, she vocalises.	The child seems to be unsettled by the low and loud sound as she moves around and wants to wander off. The vocalisation sounds like a relief that the sound has finally stopped.
31 seconds	R.2.A.2	I introduce a new sound to the child. I then use hand-under-hand technique to help the child to recognise the sound is coming from the piano.	The child tolerates the input and looks at the piano occasionally.	The child is feeling comfortable now for me to hold her hand as she engages on the task throughout. She is aware that the sound is coming from the piano as she looks at the source of the sound.
41 seconds	R.2.A.1	I improvise on the pentatonic scale again.	The child looks at the piano and starts knocking however this only lasts for about 10 seconds.	Fifteen seconds into the excerpt, the child starts to lean on the piano and moves around feeling unsettled. One can make an assumption that the child is feeling distressed or she does not like the improvisation I played.
10 seconds	P.2.A.1	I hold the child's hand to press down the	The child only tolerates the input for 5	The child is unsettled and is moving around. When I try to hold her hand to

		keys.	seconds.	play the piano, she pushes me away. The child is starting to feel tired.
23 seconds	R.2.A.1	As the child is feeling unsettled, I decide to expand the child's repertoires by introducing new songs such as London Bridge and Mary Had a Little Lamb. However, these songs are not entirely new to the child as she has been listening to them in the class on YouTube but this is the first time I play the songs on the piano for her.	The child rocks her body but only for 5 seconds. She starts to move around again.	She starts to look for something to chew such as grabbing my score for chewing. I interpret this as a sign of distress from the child.
20 seconds	R.2.A.1	I decide to play Twinkle Twinkle Little Star for the child as to calm her down.	No reactions are observed from the child. She is just sitting on the chair.	It is certain that the child is encountering sound however it is unknown at this point that she is tired or she is listening to the sound attentively.
15 seconds	R.2.A.1	I play another song, 'I'm a Little Teapot' that the child has listened earlier.	The child first looks at the piano and then starts knocking on the piano.	Child 1 shows awareness of sounds and perhaps looking to create sounds intentionally (knocking).
28 seconds	P.2.A.1	I hold the child's hand to press down the	The child tolerates the input	The child is feeling comfortable with me now however there are no other

		keys using individual fingers now.	throughout.	evidence show that she is engaging. I notice that she is tired and so the session has to stop.
9 22 seconds	R.2.A.1	I play Five Little Monkeys twice with 5 seconds break in between.	The child moves with the music.	The child is attending to the music.
27 seconds	R.2.A.1	I play Radetsky March again for the child.	The child starts to move with the music. Towards the end, she wishes to wander off.	At this stage, I am quite sure that the child is reacting to the sound of the piano as she rocks her body back and fro when she hears the music. Perhaps the duration is too long for the child to stay engaged on the task.
27 seconds	R.2.A.1	I stimulate the child with repertoires that she has to listen before: Let it Go.	At this point, the child has wandered off and walking randomly around the room.	The child is encountering sound but it is uncertain if she is attending to the sound. There are two possible explanations on this; the child does not like the song, therefore, she wanders off. The child is still coping with the transition of task (from classroom to piano session).

1.10 minutes	R.2.A.1	I continue to play Let it Go on the piano	The child occasionally walks towards the piano and looks at the piano and me.	It seems that the child is attracted to the sound of the piano which she will walk towards the piano and looks at what I am playing.
24 seconds	R.2.A.1	I improvise on the pentatonic scale again.	The child does not react.	The child is encountering sound but not attending to it.
52 seconds	R.2.A.1	I decide to play Five Little Monkeys four times for child 1 with 6 seconds break in between.	The child moves her body with the music whenever I play.	This shows that child 1 is aware of the sound. And that she likes the song.
35 seconds	R.2.A.1	I improvise on the pentatonic scale again.	The child does not react.	It seems that the child has a particular preference of sound/songs since that she only reacts strongly when Five Little Monkeys is played.
22 seconds	R.2.A.1	I try another song again - Head Shoulders Knees and Toes.	The child does not react.	
10 seconds	R.2.A.2	I play Head Shoulders Knees and Toes for Child. The child starts to hold my arm to feel the movement towards the end of the song.	The child tolerates the input.	The child starts to take on a proactive role as she holds my arm to feel the movement.

1.02 minutes	R.2.A.1	I change the song and play Bonnie Lies Over the Ocean for three times with 6 seconds gap in between.	The child only looks at the piano occasionally. Most of the time she is chewing on her toy and facing back at me.	Perhaps the child is not interested and loses attention. However, it seems like she is aware of the sound as occasionally she will look at the piano.
39 seconds	P.2.A.1	I hold the child's hand and press the keys again but slowly with individual fingers.	The child only tolerates input for 14 seconds and she starts to rub her eyes.	At this point, I notice that the child is getting tired.
45 seconds	R.2.A.1	I play a soothing song, Twinkle Twinkle Little Star to calm her down.	The child does not react and starts to cry after 10 seconds.	It is a sign that the child is getting tired and distressed.
18 seconds	R.2.B.1	I introduce low sounds again to the child and observe her reactions.	The child does not react. She rubs her eyes constantly throughout the event.	She seems tired.
1.10 minutes	R.2.A.1	I decide to play Five Little Monkeys to motivate the child. I play it twice.	The child does not react. The child starts crying and biting her hand.	The child shows sign of distress and so I have to stop the lesson.
11 20 seconds	R.2.A.2	As the child has been exposed to low register sound. I decide to continue to stimulate the child with the sound using	The child tolerates the input and holds my hand. She starts to control my hand movement by pulling it away and back	Here, the child is in control. This seems to turn into an interactive

		the hand-under-hand technique.	to the piano again.	activity.
10 seconds	P.2.A.1	I hold the child's hand to press down on the keys using individual fingers.	The child tolerates the input. When I let go of her fingers, she starts to imitate the action and intentionally to make sounds on the piano by pushing down the keys however due to the weakness of physical strength, no sound is produced. She then knocks on the piano.	Here, it shows that with appropriate support, this can lead to successful in teaching the child to produce sounds on the piano. As the child has very weak muscle, it is my job to support here to create sounds at first before letting her to do this own her own.
10 seconds	P.2.A.1	I try again but using palms this time with exaggerate movement like last time.	The child tolerates the input and when I let go, she starts knocking on the piano again.	I assume that the child finds it difficult to produce sound on the piano by pressing down the keys.
30 seconds	R.2.B.1	I play chords with regular beats on the piano to see if the child recognises the low sound of the piano and how she will react to the sound.	The child looks at the piano and starts to flap her hands. She then knocks on the piano.	The child seems to enjoy the sound as she starts to flap her hands. Knocking – intentionally to produce sounds on the piano.
46 seconds	R.2.A.1	I play Twinkle Twinkle Little Star.	The child moves her body with the music and starts knocking on the piano.	The child is attending to the song. Intentional to produce sounds on the piano as well.

2.14 minutes	R.2.A.1	I play Five Little Monkeys four times with 6-7 seconds break in between.	The child moves her body with the music and smiles. She looks at the piano and me occasionally. When I stop, she knocks on the piano.	The child engages on task throughout. One can see that she is fond of the music as she moves her body with the song. Perhaps she tries to imitate me playing on the piano – knocking.
54 seconds	R.2.B.1	I decide to play rapid, low sound on the piano to observe the child's reactions in the hope that the agitation of sounds will stimulate the child.	The child does not react when I play rapid low sounds. However, when I play one low note, she vocalises (ohh) as if she is imitating the sound.	A potential explanation on why the child does not respond when I play rapid notes, this may due to the complex sounds produced on the piano at the same time and it is difficult for the child to process. However, a single note is more straightforward to internalise and here one can see that the child is attending to the sound when she vocalises when I stop as if she is acknowledging that she knows that I stop playing. I play this three times and the child repeats three times. When I continue for the fourth time, the child starts to lean forward on the piano and tries to press the keys down on the piano. When I try again, child 1 covers her ears.

13 seconds	R.2.A.1	I play Twinkle Twinkle Little Star on high sounds, halfway through the song, I decide to use R.2.A.2 to assist the child in feeling the movement of the hand	The child starts to smile and flap her hands when I play the song.	At this moment, I interpret the hand flapping is interpreted as excitement. However, as hand flapping is considered a common self-stimulatory behaviour in children with ASC, therefore the behaviour has been categorised as 'unsure' which we have no idea if she is on task or it is repetitive behaviour.
23 seconds	R.2.A.2	I play Twinkle Twinkle Little Star, as the child is not paying attention and turns her head away. I decide to use the hand-under-hand technique to help the child again to realise where the sound is coming from.	The child tolerates the input throughout and smiles. She then vocalises when I stop.	Vocalisation – communicates she wants more? Here, the child does not rest her hand on mine but grip my fingers to feel the movement and also to control my movement.
24 seconds	P.2.A.1	I hold Child 1's hand to press down the keys individually. Then I exaggerate the movement by lifting her hand up and then back down to the key as she did it previously.	The child tolerates the input and occasionally look at the piano. She vocalises when I stop.	The child stays on task.
20 seconds	R.2.B.1	I play a single low pitch on the piano again like before to see how the child reacts.	The child covers her ears throughout.	At this point, it is unknown why the child is covering her ears. It can be that the child is encountering sound and she is attending to it by covering her ears.

				I assume that Child 1 is processing the sound causing sensory overload for her.
51 seconds	R.2.B.1	I decide to play a series of repeated notes on the low register and high register to see if the child will react differently with two contrasting sounds.	She stops covering her ears and looks at the piano. She then knocks on the piano when I stop. When I play high sounds, she stops knocking and looks at me.	Such gestures show that the child notices the difference of the sounds that can be made on the piano. At this stage, no physical or emotional evidences show that the child has a preference for sounds.
30 seconds	R.2.A.2	As the child I am playing, I use hand-under-hand technique to assist the child again. I play low register notes.	The child tolerates the input and halfway through the task, she grips my hand and controls my movement, pulling my hand away and to the piano.	Interactive and exploring the sounds by controlling my hand.
1 minute	R.2.B.1	I change and play chords on low registers and wait 15 seconds for the child to respond.	The child covers her ears again.	I interpret this as the child does not like the sound that is made on the piano. It may not be related to the low sound. Or the child is experiencing sensory overloading at the moment.
1.24 minutes	R.2.B.1	I decide to play chords with a regular	The child puts her hands down and	The child shows inconsistency of reactions with all the sounds on the

		beat.	starts to flap her hands and vocalises.	piano. It is unable to deduce what causes her to react in this way. Perhaps the child does have a preference of sounds.
48 seconds	R.2.B.1	I try to play single sound again to check if the child dislikes the sound and waits 12 seconds for the child to respond.	The child does not react.	No physical or emotional evidences are shown. The child is rubbing her eyes and tries to wander off to lie on the floor. This is an indicator that the child is getting tired or she is communicating that she does not like the sounds.
7 seconds	R.2.A.1	I play low register chords again.	The child knocks on the piano.	Intentionally making sounds on the piano.
30 seconds	R.2.A.1	I play low register chords.	The child knocks on the piano for about 2 seconds and then starts to look around. She vocalises when I stop playing.	The child encounters sound.
12 21 seconds	R.2.A.1	I play low register chords for the child, which she has experienced in the previous lesson. I play C major chord	The child starts to knock on the piano and also looks at the source of the	The child recognises the source of the sound by looking at the actions. She then engages by knocking on the

		alternate between Bass C and G.	sound.	piano. It seems that knocking on the piano has become more frequent.
22 seconds	R.2.A.1	I play Five Little Monkeys in the middle register of the piano.	The child knocks on the piano at first and then stops and starts to rock her body with the song. It is always on beat.	At this stage, I start to think that the child may be moving towards level 3 as she starts to feel the regular beat of the music and rocks her body with the music. However, according to Voyajolu and Ockelford (2017), there will be overlap in levels of musical development in children.
11 seconds	R.2.A.1	I switch to play low register chords but with no regular beat.	The child stops rocking her body.	This may be a sign indicating that the child recognises regular beat on the piano.
15 seconds	P.2.A.1	I hold Child 1's left hand and press down a note and then lift her hand away from the piano leaving ample time for the child to react. I do this four times.	The child tolerates the input and she immediately turns her head to the source of the sound (where the action takes place). Her right-hand starts knocking on the piano.	With my support, the child realises the source of the sound is coming from the hand movement when she turns her head and looks at the source of the sound immediately.
7 seconds	R.2.A.1	I play low register chords again.	The child is knocking on the piano the	The child is proactively engaging by

			whole time when I am playing.	knocking the piano.
30 seconds	R.2.A.1	I play low register chords.	The child knocks on the piano while I play and she starts to vocalise when I stop.	It is unclear why the child starts to vocalise when I stop playing. It can be imitating the sound on the piano, excitement or asking for more.
23 seconds	I.2.A.1	I play a chord and wait for the child to react.	The child reacts through vocalisation.	As the child has been exposed to various sounds and songs, it is time to introduce the interactive activity to the child. It seems like the child reacts through vocalisation instead of creating sounds on the piano. Although the vocalisation can have other meaning such as excitement, random vocalisation or trying to communicate.
7 seconds	I.2.A.1	I play a cluster of high sounds and wait for the child to respond.	The child responds by flapping her hand excitedly and vocalises.	It seems that the child is responding positively to the sounds made on the piano.
7 seconds	I.2.A.1	I play the cluster of high sounds again.	The child responds by flapping her hand excitedly and vocalises.	

14 seconds	I.2.A.1	I play the cluster of high sounds again.	The child vocalises for 12 seconds after I play the cluster of high sounds.	From the child's reaction, one can interpret that the child is engaging and interacting with me and perhaps start to show preference in sound.
24 seconds	I.2.B.1	The child starts to flap her hand non-stop and then lean forward to the piano with the gesture of pressing down the keys. I make the assumption that the child was initiating. I respond through making sounds on the piano every time she vocalises.	The child starts to get more excited and vocalises more. She then knocks on the piano when I stop.	I am working on the assumption that the child is initiating interaction and is waiting for a response. As discussed by Ockelford (2013), at this stage, one should be working on the assumption, and it is through many repetitions and occasions to understand the intention of the child.
20 seconds	I.2.A.1	When I play a middle C twice on the piano. The child immediately holds my hand and pulls my hand towards the high register of the piano. I play the cluster of high sound again and wait for the child to respond.	First, she flaps her hands and then covers her eyes. I prompt her again by saying 'High sound' and then play on the chords again. The child put her hands down and looks at the piano keys where the sound was made.	This sign indicates that the child has now taken a more proactive role in initiating the sound that she likes — using gesture such as pulling my hand towards the high register of the piano key.
3 seconds	R.2.A.2	I decide to help the child to realise the source of the sound by using the hand-under-hand technique to feel the movement of the hand pressing down the	The child tolerates the input.	The child seems to enjoy the task now.

		keys.		
19 seconds	I.2.B.1	When I stop, the child immediately pulls my hand towards the high register keys to 'tell' me to play again.	First, she rests her hand on mine to feel the movement. And then she starts to flap her hand.	The child is taking a more proactive role at the moment where she will initiate an interaction by pulling my hand to 'tell' me to play more.
32 seconds	R.2.A.1	I play Twinkle Twinkle Little Star to see if the child reacts differently and to draw her attention back to the piano. Motivate her with the familiar repertoire.	The child immediately leans towards me when I play the song. She then covers her eyes with her hands.	New behaviour emerged such as covering eyes while I was playing. It is uncertain at this stage what does this mean. The child seems to be tired, perhaps covering eyes indicates her tiredness.
9 seconds	P.2.A.1	When I complete Twinkle Twinkle Little Star, the child starts to press down the keys with her palm. I assume that the child is intentionally making a sound on the piano.	The child starts to press down the keys with her palms, but no sounds come out from the piano due to her weak strength.	It is the first time the child proactively creates sound on the piano.
10 seconds	P.2.A.1	When the child stops her movement, I support the child to press down the keys by holding her left hand.	The child only tolerates the input for about 2 seconds. She then pulls my hand towards the high registers.	The child is now able to use gesture to tell me which sounds she would like me to play.

14 seconds	I.2.B.1	I play the chord and then stop and wait for the child to react.	The child keeps pulling my hand towards the high sound every time I stop. This happens three times in that duration.	The child takes on a more proactive role in initiating interaction by using gesture to 'tell' me the sound she would like me to play.
16 seconds	I.2.A.1	I move my seat and sit on the right side to the child where the high register notes are. I play the chord again and wait for the child to react. I do this twice again.	While I am playing on the keys, the child is looking at the keys where I was playing. When I stop, the child looks up at the researcher and starts smiling. 2nd time, the child vocalises after I played. She then starts to put her hands on the piano and attempts to press them down.	The child is certainly enjoying the interactive nature of the task.
26 seconds	I.2.A.1	I decide to play longer chords on the high register with a regular beat this time to observe the child's reaction.	The child reacts through smiling and vocalising.	The child seems to notice the difference.
23 seconds	I.2.A.1	I play a single note this time and wait for the child to respond.	The child vocalises when I stop and she starts to knock on the piano.	Perhaps the child starts to respond to my sounds through knocking on the piano.

15 seconds	I.2.A.1	I then sit on the left side of the child. I play a cluster of notes on the middle register and wait for the child to react.	The child makes eye contact with me as if she knows I change the sound — she responses through vocalisation.	It seems like the child starts to notice the different sounds that can be made on the piano. Or perhaps she is purely interacting with me.
33 seconds	R.2.A.1	I play Five Little Monkeys and then I take away the melody to see if the child is rocking to the regular beat or the song. The child stops rocking back and fro when the melody is taken away.	The child rocks her body with the music. However, when I stop, she starts to vocalise. When I play only the left-hand accompaniment, she starts to laugh.	It seems that the child recognises the difference between the melody and left-hand accompaniment. Or she is just enjoying the sounds made from the piano.
24 seconds	P.2.A.1	I hold Child 1's right hand and press down the keys for 7 seconds.	The child tolerates the input. When I let go of her hand, she starts to knock on the piano.	Perhaps she is trying to imitate the action through knocking.
24 seconds	P.2.A.1	I hold the child's hand and press on a key again three times. When I stop, the child starts smiling and looks at me.	The child tolerates the input and attempts to press down the keys however due to weak fingers; she is not able to press the keys down.	The child is looking at the keys when we are playing. This shows that the child realises the source of the sound.

29 seconds	P.2.A.1	I try again by holding her right hand and press down the keys.	The child tolerates the input. When I let go of her hand, the child does not proactively create sound on the piano.	I interpret this due to weak physicality of the child. However, the child starts to initiate interaction by pulling my hand to make the sound which leads to the following event.
13 seconds	I.2.B.1	The child grabs my hand and pulls it towards the high register of the piano.	The child vocalises when I play. However, she starts to wander off.	Perhaps the child starts feeling tired since we have a long session today.
4 seconds	P.2.A.1	I hold the child's hand to press on the keys again.	The child tolerates the input. However she wishes to wander off again. The child tried to wander off again.	She shows sign of tiredness.
7 seconds	R.2.A.1	I decide to play a low register chord to stimulate the child.	The child starts to move around feeling distressed.	It is an indicator that the child is feeling tired already.
40 seconds	R.2.A.1	I play Twinkle Twinkle Little Star on the piano to calm the child down.	The child moves her body with the music. When I stop, the child covers her ears.	Perhaps the child is experiencing sensory overload or that it is due to delay in processing.

22 seconds	R.2.A.1	I then play repeated notes on low register.	After 3 seconds, the child starts to cover her ears. When I stop, the child is still covering her ears for another 10 seconds.	Perhaps she is hypersensitive to low sounds.
30 seconds	R.2.A.1	I play chords on the low register with a regular beat.	First, there are no reactions from the child. After about 9 seconds, the child starts to knock on the piano.	As interpret earlier, the knocking on the piano seems to be the child's intention of making a sound on the piano. The reason behind why the child chooses not to press the keys is unknown. There are several explanations on this.
15 seconds	P.2.A.1	I decide to hold the child's left hand and support her to press down the key. I want to show her this is the appropriate way to make a sound on the piano.	The child immediately looks at the action when I hold her hand to press down the keys. She tolerates the input as well. Her right hand is always knocking on the piano.	The child shows recognition of sound through looking. It is uncertain if the child is internalising information. She does not attempt to press the keys down when she pulls her hand away from me.
8 seconds	R.2.A.1	I decide to continue to play on the piano to stimulate the child.	The child is proactively knocking on the piano.	The child was proactively knocking on the piano.

6 seconds	P.2.A.1	I hold the child's hand again to press down the keys.	The child tolerates the input.	The child engages on task however it is uncertain if the child is drawing in the information.
30 seconds	R.2.A.1	I play Five Little Monkeys for the child.	First, the child knocks on the piano and then she stops. She starts leaning on the piano and does not respond. She starts to cover and rub her eyes.	The child seems to be tired and loses her concentration.
13 seconds	I.2.B.1	The child captures my arm and pulls it towards the high register of the piano. This happens three times throughout the duration.	The child initiates interaction by pulling my hand towards the sounds she wishes me to play.	The child shows improvement in initiating a task/interaction by acting proactively.
35 seconds	R.2.A.1	I play repeated notes on low register.	The child starts to knock on the piano and halfway through she starts to feel distressed, moves around and starts to cry.	The child engages through knocking on the piano but too distressed to continue persistently.
34 seconds	R.2.A.1	I change and play chords instead.	The child is looking around and starts rubbing her eyes.	I know that the child loses her attention and her distress is a sign to stop the lesson.

13 13 seconds	R.2.A.1	I start the session by playing chords on the low register with a regular beat.	The child does not show any responses while I was playing. However, when I stop, she starts to vocalise and makes eye contact with me.	It is unclear why the child vocalises. However, it seems that the child recognises the source of the sound as she makes eye contact with me as if acknowledging me.
8 seconds	P.2.A.1	I assume that the child is seeking an interaction. I decide to imitate her actions.	The child starts to attempt to press the keys on the piano by rocking her body forward. She also vocalises at the same time.	The child takes on a more proactive role, trying to press down the keys by leaning her body forward. Perhaps she realises that her fingers are too weak to produce any sounds. I interpret the vocalisation as excitement in lieu of trying to imitate the sound of the piano.
14 seconds	I.2.A.1	I decide to play a note on the low register of the piano and wait for the child to react.	The child vocalises and flaps her hand. When she flaps her hand, I assume that she is 'directing' me to play on the piano so every time she flaps her hand, I make a sound on the piano.	I am introducing interaction and the concept of 'cause and effect' here. I want to show her that what she did can cause an effect which in this case, when she flaps her hand, I play. I am scaffolding her that her hand-flapping is an indicator of initiation of interaction.

33 seconds	R.2.A.1	The child seems distracted and turns her back on me. I then decide to play Five Little Monkeys to stimulate the child.	The child immediately sits up and turns her head and looks at me and starts smiling. She then moves her body with the music for a short while.	The child recognises the song and her reactions to the song show extreme fondness to the song. This can be seen through her immediate reaction when I play the song on the piano.
25 seconds			The child seems to be unwell, she keeps blinking her eyes. She starts rocking her body back and fro when there is no music present.	I interpret this as delay in processing or that the child is feeling unwell today. Perhaps the repetitive behaviour (rocking her body) occurs to regulate her anxiety or to cope with the unwell of her body.
23 seconds	I.2.B.1	As the child is rocking back and fro on the chair, I also assume that she may be initiating interaction. I decide to make sounds on the piano by matching her movement. I continue to match her movement by making a sound on the piano when she flaps her hand. When she stops, I stop.	It seems that the child recognises that I am matching her movement as halfway through the event, she starts to smile at me. When I stop, she flaps her hand in excitement and vocalises. Halfway through the playing, the child started smiling as if she recognised the researcher was matching her movement. When the researcher stopped, she flapped her hand in excitement and vocalised.	Once again, I want to scaffold the idea of cause and effect. Here, I introduce the concept cause and effect through interacting with the child through the piano.

23 seconds	I.2.B.1	This then turns into a musical game between the child and I. The child is seeking more responses from me by flapping her hand and starts to vocalise in excitement.	When I stop, the child looks at me and starts to vocalise. It seems like she is communicating to me that she wants me to continue.	Joint attention is the notion here where the child and I are attuned to each other forming a meaningful interaction.
15 seconds	I.2.A.1	I decide to take on a more proactive role and make sounds on the piano to elicit a response from the child.	The child responds through vocalisation.	It seems that the child is trying to interact with me through vocalisation. However, the child has a short attention span. She turns her head facing away from me and the piano and starts to move around. She wishes to get down from the chair and wander off.
38 seconds	R.2.A.1	I then decide to play Twinkle Twinkle Little Star to stimulate the child.	The child shows no reactions.	From the camera, it looks like she is listening attentively leaning on the chair, her back is facing me. She is encountering the sound but it is uncertain if she is attending to it.
7 seconds	I.2.B.1	The child starts to knock on the chair. She is facing away from the piano and leaning on the chair. I make an assumption that the child's knocking on the chair is an	The child shows no reactions.	No reactions are observed here even when I play on the piano while the child knocks on the chair. As the child is sitting facing away from the piano, I

		indication for me to play. And so I decide to match the child's movement and make sounds on the piano.		decide to turn the child facing the piano.
10 seconds	P.2.A.1	I then hold the child's right hand and support her to press down the keys.	The child tolerates the input for about 7 seconds and then tries to push me away. She then starts to knock on the piano.	It seems that the child is trying to imitate the action however she is doing it by knocking on the piano.
26 seconds	I.2.A.1	I decide to interact with the child again by playing some chords on the piano and wait for her to respond.	The child responds through flapping her hands and looking at the piano keys. However, she has a short concentration span. She decides to wander off.	I work on the intention to interact with the child. I observe the child's reaction and try to imitate her action that is similar to call and response.
12 seconds	I.2.A.1	I decide to play high sounds on the piano.	The child looks at me occasionally and when I stop, she vocalises. She then wanders off again.	I assume the child has short concentration span.
10 seconds	I.2.A.1	I play a note again on the piano and wait for the child to respond.	The child responses through vocalisation and flaps her hand.	It seems that the child is starting to understand the interaction between her and I. However, it is uncertain if she is responding to the sound I made on the piano or she is generally responding/communicating to me.

21 seconds	R.2.A.1	I play chords with regular beat without the melody.	No reaction is seen from the child.	The child seems to be distracted and is looking at a corner of the room.
12 seconds	I.2.A.1	To try again, I decide to play a chord and wait for the child to respond.	The child starts knocking on the chair but she is neither looking at me nor the piano. She is constantly looking somewhere in the room.	
9 seconds	I.2.A.1	I decide to draw her attention by matching her knocking on the chair.	No reaction is seen from the child.	It is clear to me that the child is distracted by external stimuli, but I am not sure what it is. The room is clear and there is no other instrument in sight.
14 seconds	R.2.A.1	I then decide to play Five Little Monkeys in hope to draw the child's attention.	The child is still distracted however she turns her head once and looks at the piano for 3 seconds. She then rocks her body when I stop.	This phenomenon (rocks her body when I stop) may be interpreted as delay in processing (Bogdashina, 2016). Due to fragmented perception (reacting only parts of the stimuli/information), some children with ASC may experience delayed responses to stimuli (Bogdashina, 2016) which perhaps happens here to

				child 1.
10 seconds	I.2.B.1	As the child is rocking her body, I decide to imitate the child's movement by playing chords that match her movement.	The child continues to rock her body. She then stops and attempts to press on the piano.	The child's hands are not strong enough to make a sound and therefore I show the child that sound can be made by pressing down the keys while leaning your body forward as so you have the strength in pushing the keys down.
21 seconds	P.2.A.1	I decide to hold the child's hand and press down the keys.	The child tolerates the input and starts to vocalise. When we stop, the child covers her ears.	I interpret this as a sign of sensory-overloading for the child.
14 seconds	I.2.B.1	The child then starts to flap her hand. I make an assumption that the child is initiating an interaction, asking me to play on the piano.	She vocalises when I stop. She then looks away from the piano.	It seems that the child is distracted again.
20 seconds	P.2.A.1	I hold the child's hand and press on the piano keys.	The child tolerates the input but after 13 seconds, she starts to cover her ears. She then starts to knock on the piano and flaps her hands and vocalises.	It seems like the child is trying to regulate the sensory overloading.

28 seconds	I.2.B.1	As the child starts to vocalise and flaps her hands, I take this opportunity to interact with her again.	The child responds through vocalisation and flapping her hands.	I match her reaction on the piano showing her cause and effect, call and response. When the child stops, I stop at the same time as well. It seems that the child recognises the little game between me and her as she starts to laugh.
5 seconds	P.2.A.1	I decide to hold Child 1's hand to press down the keys thus showing such action has an effect on the piano – making a sound.	Child 1 tolerates the input. She then holds my hand.	Here I interpret the gesture as the child wants to take on more control and proactive role.
36 seconds	R.2.A.2	Now, the child's hand is resting on my hand. I play Twinkle Twinkle.	First, the child rests her hand on mine to feel the movement. After 8 seconds, she seems to be excited to hear the music and starts to rock back and fro and flaps her hands. She then knocks on the piano while I am playing.	All these shows that the child has now gained recognition of sounds made on the piano.
11 seconds	R.2.A.2	I decide to try again by using the hand-under-hand technique to help the child to feel the movement of the hand playing on	The child tolerates the input and looks at the piano. She vocalises when I stop.	

		the piano.		
15 seconds	I.2.A.1	I decide to play chords again to stimulate the child.	No reactions from the child.	The child seems to be distracted as she wanders off and is reluctant to be back on the piano.
1.15 minutes	R.2.A.1	I decide to continue to play Five Little Monkeys to observe the child's reaction. I play the music several times. First with left-hand accompaniment and the next two times with the only melody. The fourth time, I play only the left-hand accompaniment.	The child rocks side to side with the music however she only rocks for 2 seconds when left-hand accompaniment is played. She then starts to flap her hands and vocalises.	It seems that the child recognises the song, this is shown through the fact that she starts to rock side to side with the music throughout. Here, the vocalisation seems like a way of the child to communicate that she wants the melody. She walks towards the piano and starts to press on the keys. She then knocks on the piano. After several seconds, she starts to flap her hands and vocalises. I interpret this as the child wants to play the piano however due to her weak motor skills, the child does not manage to press down the keys and thus starts to knock on the piano. Her hand flapping and vocalisation may show a sign of excitement.

15 seconds	I.2.A.1	I decide to interact with the child again on the piano by playing chords and wait for the child to react.	The child starts to vocalise when I stop. She then wanders off.	The child seems to start to understand the concept of interaction as she vocalises when I stop (communicating she acknowledges I stop/she wants more). However, she has a short attention span that she decides to wander off again.
18 seconds	R.2.B.1	I decide to play chords with a regular beat and observe the child.	The child moves her body side to side.	I match the child's tempo to introduce regular beat to the child. The session ends when it is time for the child to go home.

Appendix 8 – Child 2

Child 2

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 23 seconds	P.2.A.1	Before I start the session with Hello Song, the child starts banging on the piano. I allow the child to explore the piano.	The child starts to bang the piano with both his palms.	Perhaps the child is exploring the piano and therefore leading him to make sounds on the piano intentionally. However, Child 2 is still at the stage of creating sounds for sheer pleasure rather than for musical ends.
16 seconds	R.2.A.1	I play the child's favourite song: Gummy Bear.	The child starts to bang the piano with his right palm and leans on the piano to listen. He then starts to bang on the piano again.	The child shows unconventionally listening such as leaning his ear to the piano. As for the banging, it is unsure if he is trying to imitate my gesture playing on the piano, or that he is intentionally making sound on the piano or that he is blocking my sound.
8 seconds	R.2.A.1	I play again but quieter this time as I assume the loud playing triggers the child to bang on the piano.	The child leans on the piano to listen and starts to press the keys with his finger gently. He then bangs the piano again with his palm again.	It is unsure what is going on at this point, perhaps the child is exploring the haptic/tactile nature of the piano.

20 seconds	I.2.B.1	I observe and wait.	The child starts to press individual keys randomly on the piano. When the child pauses, I press individual keys on the piano and wait for the child to respond. The child looks at the source of the sound where I was playing, he then plays at the same 'area' with his palms, first gently and then starts banging.	I am assuming that the child is seeking a response, although it is unclear, it is through many repetitions of the process that the 'cause' and 'effect' may become apparent to the child. It seems that in this instance, the child is exploring the instrument.
20 seconds	R.2.B.1	I continue to play Gummy Bear quietly for the child to listen.	The child presses the keys on the piano with his palm and then leans on the piano to listen to the song again and at the same time, he starts to press down the keys gently with his fingers.	It seems that the child enjoys producing sound on the piano. Instead of listening attentively, the child attends to the sound by creating sound on the piano.
7 seconds	P.2.A.1	(a) I stop and observe the child playing on the piano. (b) I respond by gliding the piano as well.	(a) First, the child presses the keys with his finger and then he starts to glide the keys and pauses. (b) The child watches.	It seems that the child enjoys the production of sound or it is his curiosity towards the instrument as this is the first time the child explores the piano systematically.
12 seconds	I.2.A.1	(a) I glide the piano keys again and wait for the child to respond. (b) I do it again.	(a) Within 2 seconds, the child responds through gliding the keys. (b) The child starts to glide again as well.	It appears like interaction is taking place here, perhaps imitation starts to emerge that the child copies my movement of hand. Joint attention is

				an important notion here.
10 seconds	P.2.A.1	I hold the child's hand to press on the keys. I then demonstrate to press the keys gently on the piano.	The child is unable to tolerate the input. The child watches attentively and then bangs the piano. He then leans on the piano again.	The child has yet to understand the different texture of sound that can be made on the piano. He enjoys banging on the keys.
16 seconds	I.2.A.1	(a) I glide the piano keys again and wait for his response. (b) I play again. (c) I play again.	(a) He immediately looks to the source of the sound and presses the keys with his fingers. (b) The child looks attentively again, But no other response. (c) The child looks attentively again but no response.	I assume it is delay in processing. However, when he encounters the sound he will attend to it where he turns to the source of the sound.
18 seconds	R.2.B.1	I make sounds with different dynamics in hope to stimulate a response from the child.	The child is looking around the room. No physical or emotional evidences show that he is attending to the sound.	The child encounters the sound but not attending to it. It is unclear if he is listening. The loud sound does not trigger a response. Perhaps he may be insensitive to the stimuli.
22 seconds	R.2.A.1	I play Twinkle Twinkle Little Star to the child. Another song that the child has been listening to in class.	First, the child presses on the piano with his fingers and then he starts to glide, he then looks at the source of the sound. He starts to bang on the piano again. He	Perhaps delay in processing from the previous event? However, it is uncertain at the moment. I suspect it may due to his short attention span as I

			then moves and looks around the room, starts to feel unsettled. He glides the piano again. He leans on the piano to listen.	know the child has very short attention span from the profile given. He will only attend to task less than 5 minutes.
27 seconds	I.2.B.1	(a) I watch and assume the child is seeking a response. (b) I respond through pressing a note on the piano. (c) I respond through gliding. (d) I respond through pressing a single note instead of gliding. This is to test if there is any imitation taken place. (e) I respond through pressing a single note again. (f) I imitate his gesture by pressing several keys with her fingers as well. (g) I imitate him banging on the piano.	(a) The child is not moving, he is staring at the piano. However, after 3/4 seconds, he starts pressing down key with his fingers and then starts gliding on the piano. (b) The child responds through gliding. (c) The child watches and then starts to glide the keys again. (d) The child watches and then starts to glide the keys again (e) This time, the child looks at the source of the sound and he starts to press the keys down with his fingers instead of gliding. (f) The child starts to bang on the piano. (g) The child watches. He then starts to play with his fingers.	The child is interacting with me here, mainly turn-taking, no imitation has taken place yet. It seems that with proper scaffolding, by providing an appropriate response, repeating the process, the child is able to learn the concept of 'cause and effect'. Perhaps the child enjoys the interaction between me and him. No other evidence show that the child realises the sound he made are being imitated.

32 seconds	R.2.A.1	The child is distracted and so I decide to play a piece - Fur Elise, one of the songs that the child has been listening to through his musical toy according to the teaching assistant.	Again, the child leans on the piano to listen. He then looks at the piano and starts to glide on the keys. He looks at the piano again. He then moves around, seems like he is unable to sit attentively. He then leans on the piano again and starts to glide.	Perhaps the child is initiating an interaction, that he wants to play on the piano and takes turn with me. Or he is acknowledging he encounters sounds. Or that he is enjoying making sounds on the piano.
22 seconds	I.2.B.1	(a) I assume the child is seeking for interaction. I respond through pressing down the keys and observe if the child notices. (b) I respond through pressing a cluster of keys down again. (c) I respond through pressing one key down repeatedly. (d) I respond through gliding the keys.	(a) ←The child glides on the piano. (b) The child watches.The child responds through pressing one key down repeatedly. (c) The child watches.The child responds through pressing one key down repeatedly again. (d) The child watches. The child responds through pressing down one key repeatedly and then starts to glide. The child leans on the piano. He seems to be listening. And then after 5	It seems that the child enjoys the interaction. Perhaps this may lead to imitation (approximate imitation). His late responses may due to delay in processing.

			seconds, he glides the keys again.	
20 seconds	R.2.B.1	I play Gummy Bear quietly to stimulate the child.	The child looks at the source of the sound. He then starts to press down the keys gently and glides the keys again (1s). He then moves around, appears to be unsettled.	I assume that the child is attending to the sound and at the same time, he likes to produce sounds on the piano as well.
23 seconds	I.2.A.1	(a) I glide the keys and wait for the child to respond. (b) I respond through playing a chord on the piano. (c) I respond through playing a chord on the piano.	(a) The child leans on the piano. It seems like he is listening and then he starts to glide the keys as well. He then glides for another two times. (b) The child glides the keys again. (c) The child looks at the source of the sound and then leans on the piano like he is going to sleep.	Joint attention is the notion here. The child and I engage in meaningful interaction. It is mainly turn-taking, no imitation is taking place yet.
13 seconds	R.2.A.1	I start to play a short excerpt for the child to listen.	The child is still leaning on the piano like he is tired or sleeping. He is not moving at all.	He is encountering sound, but not attending to it.
34 seconds	P.2.A.1	(a) As the child does not allow me to hold his hand. I	(a) The child looks at me and then starts pressing down the keys	It seems that he is enjoying producing sounds on the piano. I assume that the

		demonstrate pressing down the keys individually and cue the child with a quiet sign to suggest playing quietly and gently. (b) I demonstrate pressing down the keys gently.	individually. He then glides the keys again. The child presses individual keys again using his fingers. (b) The child looks at the source of the sound and starts to bang on the piano and then glides the keys.	child comes across loud sound as pleasurable as he does not seem to be disturbed by it.
30 seconds	R.2.B.1	(a) I decide to play a loud chord on the piano to the child. (b) I then play repeated chords but from quiet to loud to show the child contrasting sound. (c) I try again.	(a) The child looks at the source of the sound. The child does not respond. He then leans towards the piano and starts pressing the keys with his finger. (b) No physical evidence or emotional evidence from the child. He is just leaning against the piano. (c) He starts pressing individual keys and glides the keys again.	It appears that he leans on the piano to listen. It is difficult to make an assumption here, as the child is moving around a lot. The fact that he presses the keys and glides the keys while I am playing, it is unsure if he is attending to the sound or just sheer pleasure of producing sounds.
18 seconds	R.2.B.1	(a) I play the chords again loudly. (b) I play a series of rapid chords loudly. (c) I play it again.	(a) The child is lying on the piano facing the other end of the piano. It seems like he is leaning to listen and he starts smiling. (b) The child gets up from the piano and looks at the piano	I use rapid low chords to stimulate the child and here it seems that the child is attending to the sound which is shown through his reactions.

			and starts to cover his ear. He then starts to bang the piano. (c) The child looks at the piano and starts to glide the keys.	
28 seconds	I.2.B.1	From the above, I assume that the child is seeking a response. I glide the keys back in response to his production of sound. I repeat the task three times.	The child watches. After 5 seconds, the child glides the keys twice. The child starts to press down the keys with all his fingers and then bangs the piano with his palms again.	The child does not respond immediately may due to delay in processing.
21 seconds	R.2.A.1	I decide to stimulate the child with another song: Bonnie Lie Over the Ocean.	The child looks at the piano and then looks somewhere else and then starts to bang the piano. He then suddenly stops, seems like he is listening and then he starts to bang the piano again.	The child is encountering the sound; it appears that he is listening. Perhaps his approach of attending to sound is to bang the piano.
9 seconds	I.2.B.1	I make an assumption that the child is seeking a response or initiating an interaction. I respond to him through playing a single note on the piano.	The child glides the keys again while I am still playing Bonnie Lie Over the Ocean. The child looks at the piano when I respond and then he looks away and lies on the piano again.	The child seems to enjoy gliding on the keys. It is unclear if he glides the keys is to initiate an interaction however I assume that he is. It is through various repetition to understand the intention of the child.

11 seconds	P.2.A.1	I demonstrate to the child playing loud with fingers as now he is mainly playing with his palms banging on the piano. I hold the child's hand and support him to press the keys down.	First, the child watches attentively. He tolerates the input for about 2 seconds and then he pushes me away.	It seems that the child starts to feel comfortable with the child as he allows me to hold his hand although only for a short time.
			The child lies on the piano again facing away.	
20 seconds	R.2.A.1	To draw the child's attention back to the piano, I start to play Gummy Bear again.	First the child is playing with the my hair, after 14 seconds, he starts to lean his ear to the piano and then bangs on the piano.	There's a pattern emerge, it seems that every time the child encounters sound, once he has processed, he will bang the piano to acknowledge me.
3 seconds	P.2.A.1	I try to hold the child's hand to press down the keys with fingers.	The child glides the keys again. The child only tolerates the input for and then lies on the piano again.	It seems that the child dislikes the sensation of touch.
10 seconds	R.2.B.1	I introduce low chord sounds to the child.	The child is not looking at all. The researcher tries to get him up from lying on the piano. He starts gliding the piano again.	The child is encountering the sound but not attending to it. It seems that the child enjoys producing sound rather than attending to it.

14 seconds	I.2.A.1	(a) I continue to play some chords and then wait for the child to respond. (b) I play again. (c) I play again. The researcher played again.	(a) The child watches and glides the keys. (b) The child watches and glides the keys. (c) The child loses concentration and looks away.	The child seems to enjoy interaction however he has very short attention span.
2 35 seconds	R.2.A.1	I start the session by playing low sounds.	First, the child looks at the piano and then his attention is distracted by the labels on the piano and he starts to tear the labels out and eats them while I am playing.	The child's attention is disrupted by external stimuli – labels on the piano.
37 seconds	R.2.A.1	I play loud rapid sounds in hope to draw the child's attention back to the session.	The child is playing with the labels.	I play sounds that the child prefers in hope to draw his attention back to the piano. However, it seems that the child is distracted by the labels. He is encountering sounds but not quite sure he is attending to it.
28 seconds	R.2.A.1	I play another nursery song that the child likes: The Honeybee.	The child is playing with the labels.	The child is distracted by the visual labels. He is constantly tearing them from the piano keys.

19 seconds	R.2.A.1	I play another song Head Shoulders Knees and Toes.	The child is playing with the labels.	
9 seconds	R.2.A.1	I play Gummy Bear in hope to draw his attention.	The child is playing with the labels.	
25 seconds	R.2.B.1	I decide to play with contrasting sounds for the child to listen.	The child looks at the piano for about 2 seconds and then starts playing with the labels again.	The child turns his head to the piano when I play quietly. Perhaps he is attending to the sound even though he is playing on the labels.
26 seconds	I.2.B.1	The child initiates by gliding the keys. I quickly respond through gliding as well. I then play a chord and wait for the child to respond.	It takes about 5-6 seconds for the child to respond through gliding.	This can be explained through delay in processing.
6 seconds	P.2.A.1	I observe.	Without prompting, the child starts to produce sound on the piano by pressing down a single note repeatedly with his index finger. However, this only lasts for 6 seconds, he is distracted by the labels again.	The child is distracted by external stimuli.

19 seconds	R.2.B.1	I introduce high sound to the child.	The child is playing with the labels.	
15 seconds	R.2.B.1	I play contrasting low sound to the child.	The child turns his head to look at me but only for one second and then he plays on the labels again.	The child attends to the sound when he turns his head and looks at me. However, he is distracted by the external stimuli again.
11 seconds	I.2.B.1	I respond through gliding as well.	The child initiates interaction through gliding.	The child takes turn with me and this turns into an interactive game between the child and I.
22 seconds	R.2.A.1	I play another nursery song to the child: Rainbow	The child plays with the labels again.	He is distracted by external stimuli again.
17 seconds	R.2.A.1	I then play Gummy Bear.	The child looks at the piano for 2 seconds and then continues to play with the labels.	He acknowledges encountering the sound through looking at the piano however it only lasts for 2 seconds.
12 seconds	I.2.B.1	I respond through gliding the keys.	The child glides the keys again and	It seems that although the child is distracted by the stimuli, he will

			waits for me to respond.	initiate interaction if he wishes. This turns into an interactive game between me and the child. However, he does not look at the piano while I am playing. It seems like he wishes to play the keys.
15 seconds	R.2.B.1	I play high sound for the child.	The child is playing the labels.	Once again, he is distracted by external stimuli.
40 seconds	R.2.A.1	I play another nursery song for the child. I purposely play on the keys where the child is peeling off the labels.	The child is peeling off the stickers. He smiles when I disrupt him.	It is unknown why the child smiles. Perhaps he is thinking that I am playing a game with him.
20 seconds	R.2.A.1	I play an unknown repertoire to the child.	The child turns his head and looks at the piano. He then starts to vocalise.	The vocalisation appears to be 'complaint' that I interrupt his task in peeling the labels.
10 seconds	P.2.A.1	As the child cannot tolerate input (me holding his hand), I demonstrate pressing down the keys gentle and pause for him to respond.	The child is neither looking at the piano nor me. He is playing with the labels.	The child is distracted by external stimuli.

35 seconds	R.2.B.1	I play the repertoire again but with exaggerated dynamics (contrast of loud and quiet).	He turns his head and looks at the piano for about 3 seconds and then starts to press on the keys for 2 seconds. He continues to play with the labels.	The child engages on task as if he realises that I am asking him to. He only engages for a short while and then continues to play with the labels again.
		I try to stop him from peeling off the labels.		
4 seconds	P.2.A.1	I observe.	The child starts playing on the keys.	It only lasts for 4 seconds, he continues to play with the labels again. He is very distracted today.
18 seconds	R.2.A.1	I play She'll be coming Round the mountain as he learns the song in his music class and the material is very repetitive.	The child ignores. He is playing on the labels.	Again, distracted by external stimuli.
29 seconds	R.2.A.1	I decide to make random sounds on the piano — first high keys where the child is peeling off the labels. And then low chords. Every sound is left with ample time for the child to respond.	No reactions from the child.	

1.28 minutes	I.2.A.1	I stimulate the child with rapid low loud sound and wait for the child to respond. I imitate the child's actions such as banging on the piano, pressing the keys with fingers.	The child starts playing on the keys. He then bangs on the piano.	Perhaps he is imitating me playing loud sound. This is the longest interaction before the child gets distracted again. There is no imitation taken place. The child responds when I stop.
41 seconds	I.2.A.1	I continue to make some sounds and wait for the child to respond.	No reactions from the child.	The child is distracted by the labels again.
22 seconds	R.2.A.1	I play She'll be Coming Round the Mountain again.	The child starts banging on the piano.	It seems like he is blocking the sound that I play.
37 seconds	P.2.A.1	I observe.	The child plays individual keys with his fingers.	Perhaps the previous event triggers the child to produce sounds on the piano.
40 seconds	I.2.B.1	I respond through gliding.	The child initiates interaction through gliding and pauses. He then reacts through banging on the piano.	Here, I am assuming that the child is seeking for an interaction.

4 15 seconds	R.2.B.1	I start the session with high sound.	The child glides the keys three times while I am playing.	I assume the child is seeking for an interaction.
6 seconds	I.2.B.1	I respond through gliding the keys and wait for the child to respond.	The child watches and responds through gliding.	It seems that the child is enjoying turn-taking with me. Joint attention is the notion here.
11 seconds	P.2.A.1	I observe.	The child starts to produce sounds on the piano by pressing the keys with his fingers.	It appears to me that the child enjoys producing sounds on the piano.
14 seconds	I.2.B.1	I respond through gliding the keys.	The child glides the keys again and waits.	It seems that there is a pattern formed here. Whenever the child glides, it seems like he is 'asking' for interaction with me. Although he does not always respond to my playing, he seems to be enjoying this task very much.
13 seconds	P.2.A.1	I hold the child's hand to press down the keys. The child cannot tolerate input, I then change to a demonstration.	The child only looks at the piano for a short period and then looks away.	The child appears to be distracted as he is unable to engage on task.

28 seconds	R.2.A.1	I play a new song for the child to listen: Clair De La Lune.	The child ignores and starts to play with the labels again.	The child is once again distracted by external stimuli.
1 minute	R.2.B.1	I play low rapid sound to stimulate the child.	He vocalises and then bangs on the piano for a short while (2 seconds).	The child seems to encounter the sound as he vocalises to 'acknowledge'. Perhaps he is imitating my playing by banging the keys.
34 seconds	R.2.A.1	I play Clair De La Lune for the child again.	No reactions are observed from the child.	It seems that the child dislikes the song as he is not attending to it.
2 seconds	I.2.B.1	I respond through gliding the keys.	The child glides the keys again.	The child does not respond to my playing. Perhaps there is a delay from processing information. Or that he does not wish to interact.
22 seconds	I.2.B.1	I play high sound in hope that the child will respond.	No reactions are observed.	The child does not wish to interact. He is looking around the room.
10 seconds	I.2.B.1	I respond through pressing the keys with fingers.	The child starts to glide.	The child does not respond to my playing. He starts to play on the labels

				again. It seems that the child does not wish for an interaction.
31 seconds	R.2.A.1	I play Gummy Bear.	The child slowly turns his head and look at the piano. He then continues to peel the labels again.	The child encounters the sound and attracts his attention when he looks at the piano however he is again distracted by external stimuli.
21 seconds	R.2.B.1	I continue to make a range of sounds for the child. High and Low.	No reactions are observed. The child ignores.	The child is distracted by the external stimuli again.
		I try to move the child away from the stickers.		
4 seconds	P.2.A.1	I hold the child's hand and press down the keys individually.	The child tolerates the input.	This is the longest toleration from the child. Perhaps he starts to feel comfortable around me.
26 seconds	R.2.A.1	I make a series of sound on the piano for the child to listen.	The child bangs the piano and looks around.	The child is encountering sounds but not seems to be attending to it.

36 seconds	R.2.B.1	I play a song with contrasting dynamics.	The child watches only for 2 seconds and then looks away.	The child has short attention span or perhaps he dislikes the song I play.
23 seconds	I.2.B.1	I respond.	The child starts to glide the keys and wait for me to respond. He interacts through gliding the keys again.	This turns into an interactive game where the child and I engage on a turn-taking activity. He seems to enjoy the task as he vocalises and smiles. We are attuned to each other. No imitation has yet to be taken place.
16 seconds	P.2.A.1	I demonstrate pressing down the keys.	The child watches and starts pressing down the keys first with fingers, and then he starts to bang and then glide the keys.	The child enjoys the production of sound.
6 seconds	I.2.B.1	I response through gliding.	When the child glides the keys, I assume the child is seeking for a response.	He does not respond but he leans on the piano, it seems like he is listening.
7 seconds	P.2.A.1	I observe.	The child starts to press down the keys with his fingers. He is smiling as well.	The child appears to be enjoying producing sounds on the piano which is shown through his facial expressions.

12 seconds	I.2.A.11	I decide to imitate the child and wait for the child to respond.	The child ignores.	Perhaps the child has yet to understand the concept of interaction/cause and effect. He has no idea interaction is taking place here.
24 seconds	R.2.A.1	I play Twinkle Twinkle Little Star.	The child ignores.	Perhaps the child dislikes the song. He is encountering the sound but not attending to it.
13 seconds	R.2.B.1	I play loud sound on the piano.	The child watches and starts banging on the piano.	The child finally attends to the sound.
28 seconds	I.2.A.1	I then play a note on the piano and wait for the child to respond.	The child responds through gliding and banging.	Interaction is taken place here between me and the child.
9 seconds	P.2.A.1	I try to hold the child's hand to press on individual keys. He then started banging with his palms.	The child cannot tolerate the input and pulls his hand away. However, he presses the keys on his own with his fingers and then proceeds to banging.	It is clear that the child comprehends how to produce sounds on the piano therefore he does not need me to support him. However, he mainly likes to bang and glide the keys. I am hoping to introduce him to play using other touches.

1.04 minutes	I.2.A.1	I make a sound on the piano and wait for the child to respond.	No response from the child however after almost a minute, the child starts to glide the keys.	The child does not immediately respond may due to delay in processing.
1.24 minutes	R.2.B.1	I then proceed to introduce a new song to the child by playing Radetsky March with different dynamics.	The child watches. When I play loudly, the child starts to smile. When I stop, he glides the keys again.	It is the first time the child reacts to my playing through facial expressions. Perhaps he likes the loud sound or he is merely smiling to me. It is uncertain to determine.
37 seconds	I.2.B.1	As the child glides the keys (see above), I decide to respond through gliding.	The child responds through gliding and banging on the piano.	The child and I take turn in playing. Interaction is taking place here.
28 seconds	R.2.B.1	I continue to play Radesky March again.	The child smiles when I play the ending loudly.	It seems that the child enjoys loud sound.
5 8 seconds	P.2.A.1	I observe.	The child starts to bang on the piano.	The child likes the sensation of banging on the piano.

17 seconds	R.2.B.1	I demonstrate playing high sound for the child to listen.	The child watches, he then starts to sniff my shirt.	The child attends to the sound when he turns and looks at my playing. However, he gets distracted by external stimuli. The teaching assistant has mentioned before that this is one of the child's behaviour that he likes to sniff others.
10 seconds	I.2.B.1	I respond through gliding the keys.	The child then glides the piano keys and pauses.	By giving an appropriate response, turn-taking occurs here. He enjoys the interaction between me and him.
41 seconds	R.2.B.1	I start to play chords with different dynamics.	The child leans on the piano almost the entire event. He then turns his head and looks at the piano when I stop.	It seems that the child leans on the piano to feel the vibration and listen with his ears close to the piano. The child looks at the piano when I stop playing. Perhaps this is due to delay in processing.
5 seconds	I.2.B.1	I respond through gliding.	The child starts to glide the keys again. When I responded, the child leans on the piano again facing away from me.	It is clear to me that the child enjoys gliding on the piano and that he enjoys the interaction with me as well. Several possible explanations for leaning on the piano – tired, feel the vibration, ears close to the piano to

				listen.
23 seconds	R.2.B.1	While the child is leaning on the piano, I play rapid low chords again to stimulate him.	The child turns his head to the piano. He then leans on the piano again.	It seems that he is feeling the vibration of the sound or trying to listen closely.
10 seconds	P.2.A.1	I support the child to play on the keys by pressing his palms gently.	He starts banging and gliding the keys. He then lies on the piano.	The child enjoys producing sounds on the piano however he is mainly banging or gliding the keys. I am trying to introduce playing with other touches.
		I attempt to assist the child in sitting on the chair instead of lying on the piano. He starts to pull the plug of the piano and moves around.		
24 seconds	P.2.A.1	I hold his hand again and support him to press the keys down using palms but gently.	The child watches and tolerates the input for about 9 seconds. He then starts to bang and glide the keys again.	This is the longest input the child tolerates. Perhaps he is familiar with me now. He has yet to grasp the different touches in playing the piano.

1.11 minutes	I.2.A.1	I then play one single note and wait for the child to reply. I then try different sounds and wait for the child to respond — chords, single notes, several pitches, banging the piano.	First, the child watches, he then leans on the piano. He then responds through playing single note repeatedly before banging on the keys again.	It seems that the child has a new behaviour emerge where he constantly leaning on the piano to listen. Or feeling the vibration. He interacts with me through producing sounds on the piano. He does not respond immediately may due to delay in processing.
26 seconds	R.2.A.1	While the child is leaning on the piano, I play Gummy Bear for the child to listen.	He sits up and watches. He then starts to play with my scores.	The child is encountering sound and attending to it. This is showed through his reaction where he sits up and watches. He is then distracted by external stimuli.
19 seconds	R.2.A.1	I continue to play Gummy Bear again.	No reactions are observed here.	The child appears to be distracted and is looking around.
25 seconds	R.2.B.1	I play high sound for the child to listen.	The child first looks at me and then watches the piano. He then leans on the piano again.	The child is attending to the sounds I play.
37 seconds	R.2.A.1	I continue to play a series of sounds made up by chords and repeated	The child looks at the piano occasionally but most of the time he is	The child is attending to the sounds, but he is distracted.

		notes.	not engaging.	
5 seconds	P.2.A.1	I observe.	The child starts to bang on the piano.	This may due to the series of repeated chords that triggers the child to bang on the piano. Perhaps he is trying to imitate.
24 seconds	I.2.A.1	When the child stop, I continue to stimulate the child by playing a single note and wait for the child to respond.	No reactions from the child.	The child appears to be distracted as he moves around.
1.03 minute	R.2.A.1	I decide to introduce a new classical piece: Prelude in C, something calm and soothing for the child to listen.	No reactions from the child.	The child seems to be listening as he is sitting attentively.
1.09 minute	R.2.A.1	I play again.	The child watches occasionally and then vocalise. He then glides the keys.	The child seems to be attending to the sound.
17 seconds	P.2.A.1	I try to hold the child's hand to press down the keys. I then demonstrate since the child is unable to tolerate the input.	The child only tolerates the input for 2 seconds.	The child appears to be distracted and starts to move around again and to sniff.

32 seconds	I.2.A.1	I decide to glide the keys and wait for the child to respond.	The child responds through gliding. He then looks at the piano while I play. He takes turn with me for three times. He then starts to bang on the piano and leans on the piano again while I play.	Interaction is taking place here where the child takes turn with me. It is unknown why he starts to bang the piano and leans on it. Perhaps he is starting to feel tired.
20 seconds	R.2.B.1	I continue to play high sound for the child to listen.	The child smiles and leans on the piano.	It seems the child is attending to the sound.
33 seconds	R.2.B.1	I then play contrasting low sound.	The child is still leaning on the piano and only looks at the piano once.	It appears that the child is listening to the sound attentively.
			The child pulls the plug.	
32 seconds	R.2.A.1	I play high sound for the child to listen.	The child watches and starts pressing the keys with his fingers.	The child seems to be engaging and attending to sound although not consistently throughout.
21 seconds	I.2.A.1	I initiate interaction through gliding.	No reactions from the child.	Perhaps the child does not want to

				engage in interacting with me.
			He pulls the plug again.	
36 seconds	R.2.A.1	I play two songs: Lavender Blue and I'm a Little Teapot.	The child leans on the piano the entire event.	It seems that the child is listening however he is distracted again by pulling the plug. The session has to end.
6 1.33 minutes	R.2.A.1	I play Prelude in C for the child.	The child watches and then starts to play the piano using his fingers and then starts to glide the keys again.	The child is attending to the sound however he wishes to produce sounds on the piano perhaps.
35 seconds	I.2.B.1	I respond through gliding.	The child glides the keys.	The child does not respond when I glide the keys. Perhaps he is only seeking to produce sounds on the piano, not interaction.
31 seconds	R.2.B.1	I play high and middle sound for the child.	The child watches however not consistently. He then presses the keys with his fingers, followed by banging and gliding.	As mentioned above, the child likes to produce sounds but not attending to sound.

12 seconds	P.2.A.1	I hold the child's hand and press down the keys.	The child only tolerates the input for 1 second. He then starts banging on the keys.	The child is sensitive to touch and reluctant to tolerate my support in playing the keys. He prefers to bang the keys.
46 seconds	R.2.B.1	I play contrasting sounds for the child to listen again. Rapid low and high sound.	The child watches however not consistently throughout.	The child only looks at the piano when he wishes to engage. His attention is short, but he acknowledges that I am playing on the piano.
21 seconds	P.2.A.1	I prompt the child by putting his hand on the piano.	The child starts to bang on the piano and glide the keys.	The child appears to be feeling the keys as he rubs the piano keys with his arm and then bangs and glides the key.
32 seconds	I.2.A.1	I play a single note and wait for the child to respond.	First, no reactions are observed when I play again, the child smiles.	The child delay in responding can be explained as delay in processing.
3 seconds	P.2.A.1	I hold the child's hand to press down the keys with palms gently.	The child tolerates for 3 seconds and then he pulls his hand away.	The child dislikes the sensation of touch.
40 seconds	R.2.A.1	I play the keys from the bottom to the	The child watches when I play low	The child has a short attention span and

		top all across the range.	sound but only for about 3 seconds.	only attends to the sound that he likes.
1 minute	R.2.A.1	I play If you Happy and You Know.	The child bangs and glides the keys. When I stop playing, he pulls my hand towards the piano 'asking' for more.	It appears that the child is excited to hear the song, he initiates interaction by pulling my hand to the piano indicates to play it again.
48 seconds	R.2.A.1	I then change to play Five Little Monkeys.	The child watches occasionally.	The child attends to the sound on the piano although not consistently throughout.
16 seconds	R.2.A.1	I play I'm a Little Teapot.	First, the child ignores. Halfway through the song, the child smiles at me.	Perhaps the child likes the song. Or that he is acknowledging me that he is attending to my playing.
13 seconds	I.2.B.1	I respond through gliding.	The child starts to glide the keys.	The child does not respond. Perhaps he is just producing sounds, he is not looking for interaction.
24 seconds	R.2.A.1	I play Gummy Bear for the child to listen.	The child watches the piano occasionally.	The child is attending to sound but not consistently throughout.

19 seconds	R.2.A.1	I play Gummy Bear again but with different speed.	The child looks at me when I play slow.	Perhaps the child acknowledges I am playing at different speed.
21 seconds	R.2.B.1	I play rapid low sound again.	No reactions are observed.	The child is not attending to the sound.
2.32 minutes	R.2.A.1	I play I can Sing a Rainbow.	The child watches for almost about a minute. He then smiles at me.	It seems like the child recognises the song or that he likes the song. This is showed through his facial expression. He is attending to my playing as well.
1.18 minutes	I.2.B.1	I respond through gliding and when he does not respond, I play again.	The child glides the keys again.	The child watches but does not respond physically. Perhaps he does not wish to interact. He is merely producing sounds for pleasure.
1.01 minutes	I.2.A.1	I continue to stimulate the child by pressing random keys on the piano.	The child looks at the source when I stop and starts to press the keys with his finger. He then learns on the piano. When I play again, he looks at the piano and vocalises.	The child is attending to the sound and interacting with me. He does not respond immediately may due to delay in processing.

8 14 seconds	I.2.A.1	I interact with the child by starting to glide the keys and wait for the child to respond.	The child watches. After several seconds, he starts to press down the keys.	Perhaps this is due to delay in processing.
11 seconds	R.2.A.1	I play from high sound to low sound for the child to listen.	No reactions from the child.	Encountering sound but not attending to it.
21 seconds	R.2.A.1	I play rapid low sound for the child from the previous session.	The child watches occasionally. When I stop, he leans on the piano.	The child reacts after I stop playing can be explained as delay in processing.
41 seconds	I.2.B.1	I respond through gliding. When the child does not respond, I play a single note. I try again. I then try again.	The child glides the keys. The child watches and presses a single note. The child presses another note again. The child watches but does not interact.	Short interaction takes place here. It seems that the child is moving towards imitation.
23 seconds	R.2.B.1	I play contrasting sounds for the child to listen. High and middle.	The child watches but only occasionally.	The child appears to be distracted as he is constantly moving around, bending down to the floor.

28 seconds	R.2.A.1	I play Gummy Bear for the child to listen.	The child watches occasionally. He then glides the keys when I stop.	The child attends to the sound although not consistently. He then seeks interaction through gliding the keys.
48 seconds	I.2.B.1	I imitate.	The child glides on the keys (see above). The child watches but no response.	Perhaps the child is merely producing sound, not seeking for an interaction.
3 seconds	P.2.A.1	I hold the child's hand and press down the keys.	The child only tolerates for 1 second.	The child still dislikes the sensation of touch.
17 seconds	I.2.A.1	I continue to stimulate the child, first with low chord and allow ample time for the child to respond.	The child does not respond.	The child appears to be distracted as he starts to play with my scores.
31 seconds	R.2.A.1	I play Drunken Sailor.	No responses from the child.	The child is not attending to the sound.
21 seconds	I.2.A.1	I glide the piano and wait for the child to respond.	No responses from the child.	The child is not engaging on the task. Perhaps he is tired.

10 14 seconds	I.2.A.1	I initiate interaction by playing a single note on the piano and wait for the child to respond.	The child responds through pressing down the keys.	Imitation is not taking place here. The child seems to start to understand the concept of interaction.
27 seconds	P.2.A.1	(a) While the child rests his hands on the piano, I push his hands down to play the keys gently. (b) I try again by pushing his hands down gently.	(a) The child starts to bang the piano. (b) The child bangs and glides the piano.	The child finds the banging particularly pleasurable, or he has no idea how to control his hand. He assumes my action pushing his hand down is a cue/prompt to play on the piano.
32 seconds	I.2.A.1	I play a single note on the piano and wait for the child to respond.	The child starts banging on the piano and then starts to press the piano with his fingers.	The child recognises the cue that when I stop, it is his turn to play. He is responding to my playing every time. The child has started to grasp the concept of interaction. One can see that it is through many repetitions that the child comes to realisation.
5 seconds	P.2.A.1	I gently support the child to press the keys down gently.	The child tolerates the input and watches. He then gets distracted and turns his head away from the piano.	The child starts to tolerate the input. Perhaps he is feeling more comfortable working with me now.
18 seconds	I.2.A.1	I play repeated low notes to draw his attention back to the piano.	The child put his hand on the piano pressing down the keys gently. And	It seems that the child starts to explore different ways in playing the piano.

			then he starts to bang the piano again.	
14 seconds	P.2.A.1	I assist the child by pressing his hands on the keys gently on the piano again.	The child starts to glide the keys again.	Perhaps the child has yet to understand the different ways of playing the piano. He prefers to glide and bang the keys.
49 seconds	I.2.A.1	I play a single note on the piano again to elicit response from the child.	First, there is no response from the child. When I play again, he looks at the piano and respond through pressing down the keys.	Perhaps there is a delay in processing.
33 seconds	R.2.A.1	I play repeated notes on the low register to elicit a response from the child.	The child responses through looking at the piano and then starts to bang on the piano. He then leans on the piano.	The child responses in several ways which shows awareness of sound.
45 seconds	R.2.A.1	I play contrasting repeated notes on the high register.	The child smiles at me however he wanders off again.	It seems that the child is attending to the sound however he gets distracted. Or perhaps he is feeling tired.

42 seconds	R.2.A.1	I introduce chord sound to the child.	The child starts to spit.	It looks like the child starts to feel distressed which shows through his behaviour.
25 seconds	R.2.A.1	I continue to play repeated notes on the piano.	The child starts to spit and lies on the floor.	
11			The child comes in with a pen; the teaching assistant explains that the child was very distressed in class and does not want to let go of the pen. He is currently obsessed with the pen.	
50 seconds	I.2.A.1	I play a single note and wait for the child to respond.	The child looks at the piano and starts to respond through pressing the keys down using his pen.	This a sign that the child is aware of the sound when he reacts immediately.
39 seconds	R.2.A.1	I play low sound to stimulate the child.	The child is playing on the pen.	The child is distracted by external stimuli.
41 seconds	I.2.A.1	I play a single note and wait for the child to respond. I continue to play short excerpts to draw the child's attention back to the piano.	No reactions are observed, the child is feeling unsettled and is moving around playing with his pen.	

22 seconds	I.2.A.1	I try to draw his attention back to the piano, first by calling his name and then play on the piano. While the child is looking at the source of the sound, I see an opportunity to take away his pen and cue the child to play on the piano.	The child notices the pen is taken away from him and he starts to snatch back. He will not stop until he gets the pen.	
32 seconds	R.2.A.1	I play a nursery song on the piano for the child to listen.	The child is playing on the pen and starts to wander off.	
		I try to take the pen away but the child snatches back. When I hide the pen, the child vocalises aggressively when he cannot find the pen. I have to give the pen to him. I give instructions such as 1-minute pen and then 1 minute piano but the child is not listening.		
27 seconds	P.2.A.1	I hold the child's left hand to press down the keys while his right hand is holding the pen.	The child tolerates the input for about 6 seconds and starts to pull his hand away. When I prompt him to play on the piano by pointing on the piano, he starts	The child's attention is on the pen, he only engages when I instruct him to.

			to bang the piano.	
14 seconds	I.2.A.1	I play chords on the piano and wait for his response. Using cues (pointing on the piano) and calling his name.	The child bangs on the piano when I cue him.	It is unclear if he bangs the piano is to respond to my cues or that he is frustrated that I interrupt him playing on the pen.
32 seconds	P.2.A.1	I hold the child's left hand to press down the keys.	The child tolerates the input. His attention is then drawn to the sound finally when he looks at the piano. He then pulls his hand away and starts to play on the piano using the pen.	I successfully draw his attention back to the piano. However, he only engages to press down the keys with the pen.
1.21 minutes	I.2.A.1	I play a chord on the piano and cue the child to play by calling his name and with the instruction 'Go Go Go'.	The child starts to press the keys with his pen and then starts banging on the piano.	The child responds to the cue and engages in playing.
33 seconds	R.2.A.1	I play another song for the child to listen.	When I stop, the child starts to play using the pen.	It seems like the child starts to engage but only playing the keys using the pen.

6 seconds	P.2.A.1	I cue the child to play.	The child presses the keys using the piano and vocalises.	It is uncertain what is the reason behind the vocalisation, perhaps he is interacting with me or perhaps it is a sign of objection.
15 seconds	I.2.A.1	I play a note on the piano again.	The child does not respond.	The child is distracted playing on the pen again.
11 seconds	P.2.A.1	I hold the child's hand and press on the keys again.	He tolerates the input. When I let go of his hand, he starts to bang and glide the keys.	He is able to tolerate the input may be due to his attention is distracted by the pen. However, he manages to engage through banging and gliding the keys when I take my support away.
5 seconds	P.2.A.1		The child presses down the keys using the pen.	He is once again distracted by the pen again.
10 seconds	I.2.A.1	I try to draw the child's attention to the piano as he is constantly playing with the pen.	He starts to bang the piano with arms and elbows.	The child appears to be distressed when the teaching assistant and I try to take the pen away.

8 seconds	P.2.A.1	I hold the child's hand to play on the piano.	He only tolerates the input for 2 seconds. He pulls his hand away and starts to bang on the keys.	He dislikes the sensation of touch and prefers to produce the sound independently.
17 seconds	R.2.A.1	I play repeated chords with a regular beat for the child.	The child is looking at the floor playing with his pen.	The child is encountering sound but not attending to it and he is distracted by external stimuli.
1.09 minutes	I.2.B.1	I provide responses. I play a single note and then follow by gliding the keys.	The child starts banging on the piano. He watches when I play and then starts to press the keys down with his pen. The child watches and responds through gliding as well.	It seems that the child is able to engage on the task and interacts with me while playing with his pen.
51 seconds	R.2.A.1	I play repeated chords with regular beat again.	The child pushes my hand away and starts to bang on the piano. He is also smiling and vocalising.	Here, it may be the child cannot process all the sounds at once, or he likes to create his own sound without disruption. He finds pleasure in banging the piano, this is showed through his excitement – vocalising and smiling.

46 seconds	I.2.B.1	I respond through playing again.	The child starts to bang the piano when I stop. The child watches while I play, he then pushes my hand away. He starts banging again. He also presses the keys using the pen again.	The child seems to block my playing. Perhaps he is eager to produce sounds on the piano.
22 seconds	I.2.A.1	I continue to play the repeated bass note to stimulate the child.	The child pushes my hand away and starts to press down the keys using the pen.	The child starts to take on a more proactive role in producing sounds on the piano.
5 seconds	P.2.A.1	I hold the child's hand to press down the keys.	The child tolerates the input for 2 seconds. He is watching at the same time. He then starts to bang the piano.	.
43 seconds	R.2.A.1	I continue to play repeated notes with a regular beat.	The child's attention is drawn to the sound where he watches while I am playing. When I stop, he starts to press the keys using the pen again.	The child is attending to the sound and that he responds through playing on the keys as well.
17 seconds	I.2.A.1	I continue to play repeated notes with a regular beat.	The child watches and then starts to bang the piano when I cue him to play.	The child responds through prompting.

12 48 seconds	I.2.A.1	(a) I play a note and wait for the child to respond. (b) I then hold the child's hand to press with thumb. I want to introduce playing with individual fingers since he has been banging and playing with all his fingers most of the time.	The child looks at the piano and starts to respond by pressing on the keys as well. The child tolerates the input for about 3 seconds and then starts to bang the keys again.	The child shows awareness of sound when he is attending to it through looking. He is yet to tolerate the input of me holding his hand.
15 seconds	P.2.A.1	I hold the child's hand and press down the keys using individual fingers.	The child tolerates the input only for 3 seconds however he starts to play with fingers when he pulls his hand away from me.	The child becomes more aware of the touch on playing with fingers as now the child does not bang on the piano anymore. He is playing only with fingers. Here, it shows that by providing appropriate guidance, the child eventually will grasp the concept.
20 seconds	I.2.A.1	I play a note on the piano and wait for the child to respond.	The child watches and responds immediately through playing. However, he starts to bang the keys again.	The child is acutely aware of the sound now as he immediately looks at the piano while I play. However, he starts to bang on the piano again instead of playing with his fingers.

48 seconds	I.2.A.1	When the child stop, I respond by playing very quietly on the piano. This is to show the child that quietness can be achieved as well. And in hope that the child will copy the same by playing quietly.	The child is not looking at my playing. When I cue him to play, it takes him quite a while to respond and starts to press the keys with his fingers.	The delay in response may due to delay in processing.
39 seconds	I.2.A.1	I use cue to indicate the child to play by using gesture, hand movement of pressing down the keys.	The child is able to respond to my cue by playing with fingers however not consistently throughout. He starts to bang on the piano again.	Here, it shows that the child starts to understand the movement of playing with fingers rather than banging, although he still prefers to bang on the piano.
1.05 minutes	P.2.A.1 P.3.A.1	I hold the child's hand and sing the number of the fingers with the pitches I am going to play, this is to reinforce the idea that the particular physical action will produce a given pitch.	The child tolerates the input throughout and looking attentively. He smiles when I sing.	This is the first time the child tolerates the input for more than a minute. Perhaps the child is familiar with me now (after 8 sessions!). Or perhaps he likes my singing that distracts him from feeling the sensation of touch. His right-hand starts to play with the fingers while I support him to play using the left hand. It seems like the child starts to grasp the concept of playing with one individual finger. He is smiling after I repeat the task a few

				times and he starts to imitate the action by playing a single note with his right thumb repeatedly.
57 seconds	P.2.A.1	I hold the child's hand again and press on the keys.	The child tolerates the input throughout. When I let go, the child starts to play with his fingers.	It appears that with appropriate support, the child is able to grasp the required knowledge or skill.
22 seconds	P.2.A.1	I hold the child's left thumb, sing the number and play.	The child tolerates the input and watches attentively. When I let go of his hand, he starts to press one single note using his thumb repeatedly. He then extends to try playing with other fingers as well which lasts for 7 seconds before he starts to bang on the piano.	
18 seconds	I.2.A.1	I play a chord on the piano and wait for the child to respond.	The child immediately responds through banging the piano.	Perhaps the child is imitating me playing the chords on the piano, therefore, he bangs rather than playing with his fingers.
24 seconds	P.2.A.1	I hold the child's hand and sings the number of fingers again and support	The child tolerates the input and smiles. He observes as well.	It seems that the child is enjoying the task.

		him to play.		
14 seconds	P.2.A.1	I hold the child's hand and sing the number of fingers again and support him to play.	The child tolerates the input and when I let go, he starts to bang on the piano.	The child finds pleasure in banging the piano.
8 seconds	P.2.A.1	I hold the child's hand and sing the number of fingers again and support him to play.	The child tolerates the input.	The child starts to be familiar with the task.
18 seconds	P.2.A.1	I hold the child's hand and sing the number of fingers again and support him to play.	The child tolerates the input.	
	I.3.B.1	While I clap for joy, the child starts to imitate and clap.		Here, it seems that the child is progressing to level 3.
42 seconds	R.3.A.1	I then decide to introduce playing a short rhythmic pattern on the piano and demonstrate through clapping the rhythmic motif as well.	The child tries to imitate.	When I stop, the child starts to clap. It seems that the child is starting to grasp the concept of imitation and learning a simple pattern.

58 seconds	P.2.A.1	I hold the child's hand and sing the number of fingers again and support him to play.	The child tolerates the input.	

Appendix 9 – Child 3

Child 3

Sessions/Duration	Strategies	Researcher's actions	Child's reactions	Interpretations
8 14 seconds	I.2.A.1	(a) I play a note C6 with the intention to observe the child's reaction. (b) I then play a C2.	(a) The child reacts through a smile and he is watching my hand playing on the piano. He then starts to press down the keys repeatedly with his right hand (not entirely accurate but around the area where I was playing the C6). While playing the keys, his attention is not on the piano, he is looking around the room. (b) The child immediately turns his head and looks at the researcher and starts vocalising and rocks his body forward. The child vocalises again when I play the note again and look at the source of the sound. He then tries to grab my hand to pull it to the piano when I stop. (c)	Vocalisation – communication. Seems like when encountering the sound, he attends to it which shows through his gesture (looking and vocalising). The child tries to communicate perhaps that he likes the sound.

22 seconds	P.2.A.1	While the child pulls my hand to the piano, I hold his left hand and support him to play on the piano.	The child tolerates the input and then let go of my hand and starts pressing the keys himself. His right-hand starts pressing the keys with his palms. When I support him to press down the keys again, he stops and looks at me. He only tolerates the input for 1 second and then he starts pressing the keys down with both his palms.	He stops and looks when I support him – this shows that he encounters sound and he is attending to it. He also enjoys creating sound on his own. He is proactive on the task.
32 seconds	R.2.A.1	The child is distracted and keeps looking at the cupboard behind him. To draw his attention back to the piano. I make some sounds on the piano. (Repeated C2).	The child immediately turns his head to look at me and then starts to move his body with the sound and he stops and vocalises. He then starts to press the keys down using fingers and palms when I stop. He then starts to move his body again.	Vocalise – interaction. He enjoys creating sound on the piano. No imitation, pure creating sound. Delay in processing when he starts to move his body when I stop playing.
13 seconds	P.2.A.1	I observe his actions.	The child continues to press down the keys using his palms and fingers and then starts to move his body.	He enjoys the production of the sound. However, he cannot attend two things at once. He moves his body after the production of sound. Perhaps he is internalising the sound he plays.

25 seconds	R.2.A.1	The child then gets distracted, turns behind to look at the cupboard again. I draw his attention back by playing the repeated C2 again on the piano.	The child does not immediately turn however he turns his head away from the cupboard and starts to vocalise and smile. He then quickly turns his body back to the piano and vocalises with a smile again and looks at me. He then starts to move his body with the sound and vocalises in excitement in between. He looks at me and makes eye contact occasionally as well. He stops moving his body and starts pressing down the keys with his fingers.	He seems to be listening to the sound attentively. He enjoys the sound which can be seen through expressions. Such evidence suggests that the child is aware of the source of the sound. Move his body with the beat (early movement and music). He likes interaction and makes eye-contact.
18 seconds	R.2.A.2	As the child is making sounds on the piano randomly and with all fingers pressing down the keys at the same time, I want to help and scaffold the child to teach him that the sound is coming from one particular key and that sound can be produced through pressing one key with one finger. She then put his hand using the hand-under-hand technique to help the child to recognise where the sound is coming from.	He vocalises when I hold his hand and he tolerates the input with my support. He looks at me throughout. He then let go of my hand and starts to press random keys by himself again.	It seems like he does not know how to produce one single pitch yet.

1.02 minute	P.2.A.1	(a) I hold his hand and press down one single note. (b) I try again by holding his hand and play a single pitch. (c) I try again when the child pulls his hand away. As the child starts vocalising, when I stop, I wish to see if the child is vocalising to 'sing' the note or just sheer interaction. I then sing the note to him once I played them.	(a) The child tolerates the input and occasionally looks at me. He then pulls his hand away. and presses the keys with his palms again. (b) The child tolerates the input, he moves his body in between during the break. He then plays the keys using his right palm as well. He looks at me occasionally. (c) The child tolerates the input and he is looking at me when I sing to him however no other reactions are seen from him. He then let go of my hand and presses the keys with all his palms again.	It seems that vocalisation is just sheer interaction, the child does not try to replicate or repeat the vocalisation when I do that. He is able to tolerate input for long. He has not grasped the concept of execution of fingers, playing independently. I need time to scaffold the child.
33 seconds	R.2.A.1	Child's attention sways away again. I draw his attention back again by playing repeated single note C2.	The child starts to move his body, he then stops and vocalises. He then continues to move his body and occasionally vocalising in between. He is looking at me most of the time.	He shows fondness on repeated sound. He moves body with the beat. Vocalising - sheer interaction / excitement.

48 seconds	P.2.A.1	(a) I then support the child to play C2 with his left index finger. This is to continue to support him to play with one finger. (b) I then hold his right hand to press on the note that he has just played. (c) I demonstrate playing one single note G2 with her left index finger. (d) I demonstrate again playing G2 one index finger.	(a) The child tolerates the input and his right-hand starts to imitate the action, pressing a key using his index finger but only for 1 second and then he starts to play with all fingers again. He then turns and looks at me making eye contact when I support him to press down on one single note again. He vocalises with excitement and when I stop, he vocalises again and his right-hand starts to press on the keys. He then let go of my hand and starts pressing the keys with all his fingers again however he starts to play one single note using his right index finger again. (b) The child pushes me away and starts playing a single note using his left index finger, he then looks at me and vocalises and pulls my hand towards the low register of the piano. (c) The child watches and then starts playing with his	This gesture seems like he is asking for me to continue. He enjoys making sounds on the piano and he does not want the sound to stop. He enjoys the continuous of sound-making. With proper scaffolding, the child starts to grasp the concept and is able to produce one single pitch within short time-frame. Preference of sound starts to emerge here, Child 3 tries to communicate through gesture and vocalisation. He demonstrates through playing a single note with his index finger as well. He starts to grasp the concept. To me, it is not random keys the child is pressing. He is trying to communicate with me and trying to find the particular sound that I have been demonstrating to him.

			fingers again while looking at me. (d) The child starts to play with his right index finger and then all his fingers and he starts vocalising and starts pressing individual notes using his left index finger randomly.	
1 minute	P.2.A.1	(a) I then support the child to play repeated G2, the sound that the child has been looking for. (b) I support the child to play the note again. (c) I make an assumption that the child is trying to communicate to play more, and so I support him to play on the note repeatedly again. (d) I support him to press the note down together with the researcher. (e) I deliberately stop, this is to help the child to learn initiation or take on a more proactive role to create the sound on his own.	(a) The child starts vocalising and he tolerates the input and he looks at the source of the sound attentively. (b) The child starts vocalising again but longer this time. He tolerates the input as well and looks at me. When I stop, he starts vocalise more and starts banging on the piano with his hand. (c) The child tolerates the input for 5 seconds when I let go of his hand, he starts pressing down the key on his own. (d) The child pulls my hand to the piano to 'tell' me to play and vocalises at the same time. The child	Excitement of the creation of the sound that he likes is showed through vocalisation and his attention to the sound (longer). With proper scaffolding, the child finally able to produce the sound on his own, although it is just a short time. At this stage, the child enjoys the sound I play as he stops and pulls my hand to the piano to 'tell' me to play.

			tolerates the input and starts moving his body with the beat. (e) The child starts pressing down the keys on his own. And then continues to play with his palms.	
18 seconds	I.2.A.1	(a) I imitate the child's playing with palms and observe his reaction. (b) I deliberately take no action when the child grabs her hand towards the piano, she wants to observe how the child will communicate and how to 'tell' her the sound that he wants. (c) I copy his action and then stop again deliberately so that the child will initiate the interaction again.	(a) The child looks at the movement of the hand and then initiates interaction by grabbing my hand to the piano. (b) The child vocalises and pulls my hand to the piano again (and when I do not play, the child points at the piano and starts playing a repeated D3 on the piano. (c) The child starts pressing the keys using his palms.	I am trying to understand the child and therefore I am experimenting on the sounds to establish what the child desires. Child communicates through gestures such as pulling my hand and vocalisation. He likes to interact with me. I can see that the child is able to initiate the sound he likes by pressing on the keys he wants although with such a short time frame.
16 seconds	R.2.A.1	I decide to play D3 repeatedly for the child to listen and deliberately stop in between.	The child immediately turns his head and looks at me and vocalises. The child moves his body with the beat as well. When I stop, he vocalises longer and starts pressing the keys on the piano.	He communicates through gesture which is vocalising longer to indicate me to continue to play.

6 seconds	R.2.A.2	I then support the child using hand-under-hand technique to feel the movement of the hand while listening to the repeated single note being played on the piano.	The child tolerates the input. When the child let go of my hand, one can see that he continues with the movement of the hand as if he is trying to imitate the movement.	I scaffold the child through kinaesthetic input. The child seems to grasp the idea of the movement of hand which he imitates the movement as well.
4 seconds	P.2.A.1	I then hold his hand and press down the key.	The child tolerates the input and then starts to play with all his fingers again.	Longer time to grasp the concept to play with individual fingers. More pleasure in pushing down the keys with all his fingers. May due to motor skills, easier to push down all the keys at once.
10 seconds	I.2.A.1	I imitate his movement again by pushing down the keys all at once.	The child watches at the source of the sound and when I stop, he starts leaning forward and pushes down the keys again and starts to vocalise.	Unknown what is the interaction, no eye contact, perhaps he just wants to create sound on the piano?
20 seconds	P.2.A.1	(b) I support the child to play individual keys.	(a) The child then starts to press down individual keys using his left hand however he is not paying attention at the piano. He is looking at the ceiling while he does that. I imitate the child and demonstrate playing with	Perhaps it is spur of the moment to press down the keys individually.

			individual fingers. The child turns his head towards the sound when I start playing. He then vocalises and looks at me and grabs my hand towards the piano. (b) The child tolerates the input for 7s. He is not paying attention, he is looking at the ceiling.	
17 seconds	R.2.A.1	I draw his attention back to the piano by playing repeated C2 and C3.	The child starts to move his body with the beat and he starts to vocalise, and he starts playing the key repeatedly with his left index finger. He then continues to play with his palms.	Starts to recognise individual pitch which he presses down using his index finger repeatedly, seems like he is imitating me.
5 seconds	R.2.A.1	I introduce new sound to the child. I glide the keys from bottom to the top.	The child watches attentively and then he starts to pull my hand to the piano.	He is fascinated by new sound, watches attentively and initiates interaction.
22 seconds	P.2.A.1	I support him to make glissando on the piano however the child will not let me to glide the keys. I support the	The child tolerates the input and he is constantly looking at me. He then starts to move his body to the beat. He then stops and starts to vocalise.	I suspect he is sensitive to the haptic/tactile input from gliding. He is able to execute with one finger after

		child to play repeated C3 on the piano.	I let go of his hand, he starts to press the note repeatedly on his own. And then presses the keys with his palms again.	supporting him for so long.
4 seconds	R.2.A.1	I continue to stimulate him with the repeated notes.	The child looks at the source of the sound.	
45 seconds	P.2.A.1	(a) I hold his left index finger and support him to play the note repeatedly again. (b) I support the child again to play on the repeated note. (c) I continue to support the child to play the note repeatedly.	(a) The child tolerates the input and looks at the source of the sound. When I let go of his hand, he starts pressing the key repeatedly. (b) The child tolerates the input and starts to move his body to the beat and starts vocalising. (c) The child tolerates the input and vocalises several times throughout. When I take away the support, the child starts to press the key repeatedly by himself and stops. (d) He then pulls my hand to the piano again. I support him to play. When I let go,	Shows enjoyment in producing the sound and also the interaction between me and him.

			he starts playing keys with his palms.	
18 seconds	P.2.A.1	(a) I decide to support his right hand to play. (b) I support him to press down repeated keys again using his left index finger.	(a) He only tolerates for and then pushes my hand back to the low register of the keys and he puts his left hand on the piano indicates me to play. (b) He tolerates the input 5 seconds and moves his body at the same time. When I let go of his hand, he presses random keys on the piano with both his index fingers and then continues by playing with his palms.	He shows preference in low sound.
26 seconds	I.2.B.1	The child pulls my hand to the piano again. I play repeated notes C3 on the piano.	The child starts to vocalise. He then put his ear to the piano to listen to the sound. He then moves his body to the beat. He continues to move even when I have stopped playing. The child then initiates interaction by pressing down a key to indicate me to continue. He then moves his body with the beat again.	The child is very engaged on the task which shows he likes the session. He delays in responding may due to delay in processing.

22 seconds	P.2.A.1	The child starts to press down the keys with his palms again. I hold his hand and press down repeated C3 again with one finger.	The child starts to move to the beat and he tolerates the input. He vocalises and puts his ear on the piano. I stop playing, he then vocalises again. He looks at me and then starts playing on the exact note.	Vocalise – trying to communicate. He likes the sound and interacts with me to indicate me to play.
30 seconds	P.2.A.1	I support the child to press down the note repeatedly.	The child tolerates the input with vocalisation in between and he moves his body throughout with the beat as well.	
14 seconds	P.2.A.1	I let go of the child's hand, he starts pressing on the keys repeatedly. He then pulls my hand to the piano to indicate me to play. I support him to play the note repeatedly again.	The child tolerates the input and is now able to produce repeated notes without support. He then pulls my hand again back to the piano. He tolerates the input.	He is able to produce sounds without support however it seems that the child enjoys more when I play instead of him producing the sound himself.
			The child starts to move around and seems distressed with vocalisation. He then starts to hit his head with his hand.	

6 seconds	I.2.B.1	The child plays repeated note on the piano. I assume that the child wants to continue. She then imitates him.	The child moves his body even there is no sound.	Perhaps it is a sign of delay in processing or that he is feeling distressed.
10 seconds	R.2.A.1	As the child is moving his body. I decide to play repeated C2 and C3 for the child.	The child moves his body throughout and looks at the source of the sound.	He is attending to sound.
10 seconds	P.2.A.1	I grab the child's hand and support him to play the repeated notes while my left hand is playing the repeated C2.	The child tolerates the input for 4 seconds. He moves his body throughout. He then let go of my hand and vocalises.	
10 seconds	R.2.A.1	I continue to play repeated notes on the piano.	The child pulls my hand to the piano and points at the keys to indicate me to continue to play. He moves with the beat and looks at the source of the sound.	The child is attending to the sound.
9	R.2.A.1	I start the session by playing repeated note C3 that the child has experienced	The child turns his head and looks at me and then he starts to rock his body back and fro and he presses	The child encounters sound and the evidence here shows that he attends to sound where he looks at me and starts

22 seconds		previously.	down the keys.	rocking his body with the sound. This lead to the child intentionally to create sound on the piano (imitation).
10 seconds	P.2.A.1	I hold the child's hand to press down the keys.	The child looks at me and tolerates the input. He then let go of my hand and starts to press down the keys by himself. The child engages in eye contact; it seems like he is asking for more.	The child is fascinated by the sound made on the piano when he immediately looks up at me when I hold his hand and press down the keys.
21 seconds	P.2.A.1	I hold his hands again and push down the keys but this time using palms.	The child tolerates the input. He looks at the hand movement. He then let go of my hand and starts pressing the keys down (8s). He vocalises at the end and looks at me.	The child is able to create sound on the piano. He then seeks interaction by engaging eye contact with me. His vocalisation seems to do with the sheer pleasure of interacting with another person than factors relating to musical structure or content.
8 seconds	P.2.A.1	I hold his hand again but this time using just one finger to press on one key repeatedly.	The child engages by tolerating the input and looks at the movement of the hands. He then presses down the keys on his own.	These accounts suggest that Child 3 is at the stage of making sound for its own sake rather than for musical ends.

17 seconds	R.2.A.1	I continue to provide wide listening experience for the child. Here, I play a series of repeated notes of C2 and C3. This strategy is also equivalent to Level 3 Reactive Element A where a simple pattern is formed. Repeated notes.	The child starts to rock his body and then he looks at the movement of the hands and starts smiling at me.	It appears that Child 3 recognises the source of the sound which is seen through his reactions. However, it is uncertain at this stage if the child grasps the musical structure – repetition.
14 seconds	R.2.A.1	I then play a contrasting sound on the piano, chord picking of C major. Here, the regular beat that I am playing can be associated to Level 3 Reactive Element B where simple pattern is formed through a regular beat.	The child starts to move his body together with the beat. He maintains eye contact with me. The child then starts to join in with me pressing on the keys with his fingers.	It is interesting to reflect the extent to which Child 3 processes the sounds through his expressions. These accounts suggest that the child is attending to sound however it is uncertain if the child recognises the regular beat although he is rocking with the beat (early music and movement).
9 seconds	I.2.A.1	(a) I interact with the child by imitating his playing. (b) I try again by playing the same keys of the child. (c) I copy him by playing with her palms.	(a) The child starts to cover his ear and vocalises. (b) The child puts his hands down and starts pressing down the keys randomly using his palms (c) The child stops and looks at my	It may seem that the vocalisation and child's action – covering ears suggests that at this instance, there may be sensory overloading, or he is trying to process the information of joint attention/ imitation between two people.

			hand.	(c) Here, the evidence suggests that the child has yet to encounter imitation and is just enjoying making sound for its own sake. It seems that the child is aware that what they do have an effect contributing to their developing cognisance of a sentient 'other' out there (Ockelford, 2013).
14 seconds	R.2.A.1	The child's attention is distracted and he starts to look around the room. The researcher decides to stimulate him by making a series of low sounds with chords.	The child looks at me.	It seems that the child recognises that I am the one who made sounds on the piano thus making eye contact with me suggesting he acknowledges my presence.
19 seconds	P.2.A.1	The child turns around and looks at the direction of the cupboard with instruments. I decide to draw his attention back by holding his left hand to create sounds on the piano.	The child immediately turns and looks at the movement of the hand where the sound is made and tolerates the input. He looks at me as well. He then starts to use his right hand to press down the keys. He is then distracted again looking at the cupboard.	It seems that the child enjoys making sound on the piano where he tolerates the input from me holding his hand to press down the keys and he starts to create sounds on the piano using his other hand. However, it is unclear at this stage if such gesture is to imitate what I am doing.

21 seconds	I.2.A.1	I wait for several seconds and then I play two single notes on the piano to elicit a response from the child.	The child immediately turns his head towards the source of the sound and looks at the piano. He then starts to press down the keys with both his palms. He then looks at me and vocalises.	These accounts suggest that child 3 is attending to sound as his attention is quickly drawn back to the piano and continues his session with me. He starts to interact with me by providing a response (pressing down the keys with his palms). Noted here that there is no imitation taking place. The child vocalises to interact with me as well.
7 seconds	I.2.A.1	I respond by demonstrating playing C4 (middle C) repeatedly for 3 times with one finger.	The child is looking at the hand. The child then copies and plays the same note exactly.	It is interesting to see imitation starts to emerge here. The intense interaction between the child and I which both of us are attuned to each other, paying attention of what each other is doing. This can be related to Level 3 interactive where the child imitates the sound I play.
21 seconds	I.2.A.1	I continue and imitate the same note again.	The child is distracted; he turns his head and looks at the cupboard again. However, after 7 seconds, he turns and presses the keys down on the piano. There's no imitation taking place.	Evident shows that the imitation takes place coincidently, the child's awareness of imitation is still weak and needs more scaffolding.
9 seconds	P.2.A.1	While the child is pressing random keys on the piano, I hold the child's hand to support him to play individual	The child tolerates the input and when I play the pattern again, the child looks at the keys and then	The child is attending to the sound created on the piano however it is unsure what is the intention of the vocalisation. It can be sheer

		keys with simple pattern, simple note E followed by a note D. I then imitate the pattern to observe if the child acknowledges the imitation.	vocalises.	interaction with me or acknowledgement of his awareness of sound created on the piano.
8 seconds	I.3.C.1	I play the pattern again but with a slight alteration, E, D and C.	The child looks at the keys being played. He then starts playing repeated C.	Imitation may start to emerge here.
19 seconds	I.3.C.1	I play the same pattern again three times.	The child looks at the keys being played and then he starts playing random keys on the piano.	The child is unaware of how to imitate the sound. However, he enjoys creating sounds on the piano.
17 seconds	P.2.A.1	(a) I continue to support him to play the pattern by holding his hand. (b) I try again.	(a) The child tolerates the input and he looks at the piano when I support him to play. He then let go of my hand and turns his head to the back. (b) The child immediately turns his head and looks at me and then on the piano and tolerates the input before pushing my hand away.	Aware of the sound, but no imitation.

18 seconds	R.2.A.2	I introduce new sound to the piano and I use hand-under-hand technique to help the child to feel the movement of the hand. I introduce a chord.	The child tolerates of the input and then moves his hand away. His attention is drawn to the sound when he is looking at my hand creating the sound on the piano and when I stop, he presses the keys down several times with his palms.	The child is aware of the sound but does not recognised the different qualities of the sound.
48 seconds	R.2.A.1	I play C major chords with regular beat that the child has encountered previously in order to see if he reacts differently or if he recognises the patterns.	The child looks at me and starts rocking his body with the beat. The cupboard behind is a distraction as he is constantly looking at the cupboard while rocking his body. He then stops and looks at the cupboard while I am playing. When I stop, he turns his head back to the piano and then starts pressing down keys. He then looks at my hand when I start playing again.	Here, as the child is non-verbal, the researcher is using different methods to elicit a response. It is through several repetitions that the researcher will come to understand the child's expressions and gestures.
8 seconds	R.2.A.2	The child then touches my hand while I am playing on the piano but only for 1 second. I assume that the child is trying to communicate with me that he wants support to feel the movement of	The child tolerates the input for 2 seconds and then slides his hand down. I try again and he only tolerates for 1 second. He then starts pressing down the keys using his	It seems that the child is seeking interaction from me rather than trying to imitate what I am doing.

		the arm. I grab the child's hand and put it on mine.	right hand.	
15 seconds	P.2.A.1	As the child cannot tolerate the input, I use hand-over-hand and grips the child's fingers in between my hand to support him to play the keys while feeling the movement of my hand.	The child tolerates the input and he occasionally makes eye contact with me. When I let go of his hand, the child starts pressing down the black keys using his palms again	Enjoys creating sound and seeks interaction.
9 seconds	I.2.A.1	When the child stops and looks at me, I decide to stimulate the child from the sounds that he has just created (cluster of black keys) but individually (F2#, G2#, A2#, C3# and D3#).	The child looks at the keys that I play. He then imitates the gesture by playing a single note F3 repeatedly.	It seems that the child is able to imitate the gesture or understand the gesture, but not exact imitation (approximate imitation).
10 seconds	I.2.B.1	The child then grabs my hand and pulls it to the piano to indicate me to play. I hold his hand and play a repeated G3 on the piano.	The child tolerates the input and then he let go of my hand and presses the keys on the piano randomly.	Initiates interaction, he knows what sounds he wants to play or listen. He is taking a proactive role in interaction. He likes making sound on the piano as well.
30 seconds	R.2.A.2	I want to provide a wide range of listening experience to the child and	The child tolerates the input only for 2 seconds and then he starts vocalise	The child recognises the song through excitement with vocalisation and smiles.

	R.2.A.1	so I decide to explore something different. Here, I play a song called Do Re Mi, the reason is that the music is repetitive and it is the song that the child listens in his music class previously. I hold his hand while playing the song so that the child can feel the movement of the hand.	with excitement. He looks at my hand on the keys. He starts to join in with me by randomly pressing a key using his left hand. The child then turns his head again to look at the cupboard.	Interacts with me by joining in.
15 seconds	I.2.A.1	To draw his attention back to the piano, I decide to make sounds on the piano (glide). I provide sufficient time for the child to react.	After 5 seconds, the child turns his head and looks at me and then starts pressing on the keys with his palms again and he grabs my hand and pulls it back to the piano.	At this point, I am certain that the child enjoys the interaction and creates sounds on the piano. There are similar gestures that can be served as an indicator or communication tool from the child.
35 seconds	R.2.B.1	I continue to stimulate the child with a different range of sounds. Here I am introducing dynamics. Using the same C major chord pattern that the child has listened previously.	The child looks at the piano and he is just sitting there listening attentively. He then vocalises while I am playing loud. When I play quietly he looks at me and then starts pressing down the keys on the piano.	It seems that the child has no awareness yet on the different sound (dynamics) made from the piano yet as there are no specific expressions from him to tell the difference even I alternate between loud and quiet for several times. The child enjoys more by playing on the piano and interacting with me.
15 seconds	I.2.B.1	When I stop, the child grabs my hand and pulls it to the piano. I play short excerpts while gripping the child's	The child tolerates the input and looks at my hand playing on the keys. When I stop, he initiates the	The child seeks to initiate interaction. He likes the sounds being played on the piano

		hand at the same time for him to feel the movement.	interaction again by pulling my hand back to the piano.	although no preference has shown yet.
20 seconds	P.2.A.1	I decide to support the child to play by holding his finger to press down the keys.	The child looks at the piano keys and tolerates the input. He then let go of my hand and vocalises. He then starts pressing down the keys with his palms again.	Enjoys making sounds.
22 seconds	I.3.C.1	I then decide to imitate the movement of the child.	The child looks at the movement of my hand playing on the piano. The child then starts to imitate the gesture by pressing down the keys again using palms. He then looks at me and vocalises again.	At this stage, it is unclear if the child recognises his gesture being imitated. He seems to imitate my playing but no other emotional evidence to support this. His vocalisation seems to be sheer interaction with me.
30 seconds	R.2.A.1	I continue to play repeated notes on the lower register to observe the reaction of the child.	The child looks at the movement of my hand, he then starts to join in and play with his finger and then palms. He then stops and looks at me and starts rocking his body with the sound. He then stops and looks at my hand. He then turns to start playing on the piano with his fingers.	Enjoy interaction/playing together with me. No imitation has taken place yet. He listens attentively by looking at my hand. Enjoy creating sound after listening.

22 seconds	I.2.B.1	I make an assumption the child is initiating interaction as he starts to play on the piano.	The child plays on the keys with his index finger. I observe and then copy the child. The child watches my hand playing on the piano. When I stop, the child presses the keys down using his palms again. I imitate his playing again. The child responds through playing random keys using his index fingers and then palms. He then looks at me.	Sheer initiation of interaction. No imitation taking place. Proactively making sound on the piano.
28 seconds	R.2.A.1	The child grabs my hand again to the piano. I decide to play Do Re Mi again.	The child looks at my hand and smiles. He then rocks his body to the music and presses on the piano keys with his palm towards the end of the song.	Repetitive listening materials to build his selection of songs and sounds. Child enjoys the song which is showed through his expressions, body gestures.
12 seconds	I.2.B.1	The child initiates by playing a repeated C5# he then grabs my hand again to the piano and vocalises. I respond by copying the same note.	The child starts to play together with me by playing a repeated F4 with his left index finger, he then uses his right index finger and taps on my hand which is playing the repeated C5#, he then pushes my hand away. I decide to tap on the child's hand and observe his reaction. He starts vocalising.	Not clear what is the intention (perhaps to feel the movement) or indicate that this is how he wants the sound to be made by tapping with one finger. I help the child to feel (tactile) on my hand by supporting him to tap on my arm. Child's vocalisation sheer interaction, not musical.

11 seconds	P.2.A.1	I support the child to press down the keys with his index finger. This is to show the child how sound can be created on the piano.	The child tolerates the input and looks at the movement before letting go. He then starts to press down the keys with his palm using his right hand and looks at the researcher and turns his head again to look at the cupboard.	Enjoy creating sound, prefer using palm.
40 seconds	I.2.A.1	(a) To draw the child's attention back to the piano, I make some sounds on the piano by pressing some random keys. (b) I then hold his hand and press down the keys gently to show the child that there are other ways in playing the piano and that different touch creates different sounds. (c) I hold his left hand again and press on the keys.	(a) The child immediately looks to the source of the sound and then starts to press the keys down with his palms again. (b) The child tolerates the input while looking at the keys at the same time. He then let go of my hand and starts pressing down the keys loudly using his palms. (c) The child immediately looks at the source of the sound and tolerates the input. His right-hand starts to imitate the gesture by pressing repeated F5 with his index finger. I try again by holding his left index finger and press on the keys, he tolerates input. He	No clear idea create sound differently. I use haptic/tactile to help the child to understand by providing support and scaffold the child in developing awareness of the production of different sounds.

			then let go of my hand and starts to play with his palms.	
44 seconds	R,2,A,1	I play a series of repeated F2 and F3 to extend the child's listening experience.	The child looks at the movement of the hand. For 10 seconds, it seems that he is listening to the sound attentively. He then starts to play on the piano with his palms. And then vocalises with a smile. He then stops and looks at my hand playing on the piano again. When I stop, he presses on the keys down using his left index finger again on a repeated key. When I play again, he moves his body with the beat. He then stops and looks at my hand and starts joining in.	Although the child is not looking at the movement of the hand, it seems that he is sitting and listening to the sound attentively. Vocalisation more like excitement rather than musical ends. The child plays when I stop, his way of responding to sound. Musical – understand taking-turns and moves his body to the beat.
8 seconds	P.2.A.1	As I seem to notice that the child starts to understand the production of the sound on the piano, she then slightly introduces simple pattern on the piano by holding the child's hand to play all the Cs across the piano.	The child tolerates the input and smiles throughout.	The child seems to enjoy creating different sounds on the piano with my support.
6 seconds	R.2.B.1	As the child and I have been playing around low and middle registers of the piano. I decide to introduce different	The child looks at the source of the sound and then pushes my hand away and starts pressing the keys	It seems that child does not like the sound. Shows through gesture however it is difficult to tell at the moment. Or he just

		sounds to the child by playing rapid high notes.	with his palms.	wants to create sounds on the piano.
36 seconds	R.2.B.1	I then play contrasting sound (low rapid register notes) on the piano to observe the child's reactions.	The child immediately turns his head and looks at the source of the sound and sits very still. He then wiggles his fingers on the piano seems like he is trying to imitate the movement of the fingers. He then starts to join in by pressing down the keys with his palms.	Seems to be interested in the low sound. Listens attentively and looks intensively at the source of the sound for a long period. His action of wiggling the fingers seems to be the start of imitation taking place. Or he is trying to imitate.
12 seconds	P.2.A.1	I hold his hand and support him to play low register of notes that I have just played. This is to support the child to realise where the low sound was coming from.	The child looks at the source of the sound and tolerates the input. He then let go of my hand and starts pressing down the keys on the middle register of the keys where he usually plays.	Starts to introduce in creating different sounds across the piano. No knowledge yet perhaps he needs more time.
8 seconds	P.2.A.1	The child grabs my hand and pulls it to the piano. I then hold the child's hand and play repeated notes on the piano.	The child tolerates the input and looks at the source of the sound at the same time. He then let go of my hand and starts pressing the keys.	
19 seconds	R.2.A.1	The child grabs my hand and pulls it to the piano again. I continue to play	The child immediately starts to move his body to the beat and then	The child seems to like interaction and playing together with me. All happen while

		the repeated notes.	stops moving and vocalises in excitement. He then looks at the source of the sound. He looks up to me and starts pressing down the keys. He then put his ears on the piano to listen to the sound.	I am still playing. It seems that the child likes repeated notes on the piano.
28 seconds	R.2.B.1	I change the sound to observe how the child will react. I play rapid low sound that the child seems to be interested in.	Again, the child listens very attentively and looks at the source of the sound for 13 seconds. He then put his ears again on the piano to listen to the sound. He then starts to press the keys using his palms and his fingers.	Enjoys low rapid sound. His concentration is longer than usual.
12 seconds	R.2.A.1	The child pulls my hand to play on the piano again when I stop. As I am not sure what he likes, at this stage, the sound that I made is experimental. I start playing repeated notes that the child pulls her hand to.	He looks at the source of the sound. The child starts to move his body to the sound.	It seems like the child enjoys the sound being made on the piano.
20 seconds	R.2.A.1	I want to extend the child's listening experience, as at the moment it is just some sounds made on the piano. I want to demonstrate to the child that	The child looks at the source of the sound. When I stop, the child starts	It seems like the child recognises the difference between songs and sounds. He

		songs and melodies can be created on the piano as well. She starts playing nursery song – Five Little Monkeys.	to play on the keys with his palms.	looks attentively at the source of the sound.
16 seconds	I.2.A.1	I play a single note and observe the child's reaction in hope that the child will imitate.	The child looks at the source of the sound. He then starts pressing down the keys with his palm again. When I play again, he will stop and look and then starts pressing the keys with his palms again.	No imitation, the child imitates the gesture (playing on the piano) but not the exact note yet.
20 seconds	I.2.B.1	The child pulls my hand to the piano again. I hold his hand and play repeated C4 on the piano. The child then pushes my hand to the lower register of the piano.	The child put his ears on the piano to listen to the sound again. He then starts to join in with me. He then looks at the source of the sound and then starts pressing the keys.	Child's preference of sound starts to emerge when he pushes my hand to lower register of the piano.
1.38 minutes	R.2.A.1	He then pulls my hand to the middle register of the piano. I am assuming that the child wants me to make sounds on that register range. I start to play a piece by Burgmuller that starts on that register. I repeat twice.	The child is watching attentively throughout and then vocalises in between. He then starts to join in by pressing the keys. The child watches at the movement of the hands and vocalises in between and starts pressing the keys.	The child likes the song, paying attention longer as usual.

5 seconds	I.2.B.1	The child pulls my hand to the piano again when she stops.	The child then initiates by pressing the keys.	Trying to communicate with me the sound he wants or the song. Initiates by pressing the keys as gesture, I am trying to understand, first I play randomly on a note and stop. The child grabs my hand back to the piano and presses on the keys with his palm again. I imitate the gesture by playing with palm and stop. The child grabs my hands again and presses on the keys. I then play Burgmuller again.
40 seconds	R.2.A.1	I play Burgmuller again.	The child starts to rock his body with the music and starts smiling. He then stops and looks at the source of the sound. He then vocalises. Occasionally he looks at me. He then starts to join in by pressing the keys on the piano even when I have stopped.	Shows fondness to the song.
9 seconds	I.2.B.1	The child initiates to play on the piano by pressing down the keys with his palms. I respond through pressing down the keys with my palms as well and waits for the child to respond.	The child presses down the keys when I stop which prolongs for 3 times throughout the event.	This turns into interaction of turn-taking between the child and I.

15 seconds	I.2.B.1	When I stop, the child constantly pulls my hand to the piano.	The child pulls my hand to the piano when I stop playing which happens 6 times throughout the event.	He likes the interaction by pulling my hand to create sound. Turns into a little game between me and the child.
10 23 seconds	R.2.A.1	I play C major chord from the previous lesson.	The child occasionally watches me but mainly looking at the cupboard.	The child is not paying attention. He is encountering sound but not attending. He is distracted by the cupboard from behind again.
1.16 minutes	R.2.B.1	Stimulate the child with low, rapid sound from the previous lesson with gaps in between for the child to respond.	The child watches at the piano most of the time and smiles. He then starts to press the keys down using his palm. He vocalises when I stop.	Again, the child is fascinated by low rapid sound. When I stop, the child responds through playing. Seems like he is imitating.
8 seconds	I.2.B.1	Child initiates pressing on the middle register of the piano. Researcher responds by playing at the same range. Using the same material from Burgmuller.	The child starts to join in by playing a single note.	The child joins in by playing one single note repeatedly while I am playing. He seems to enjoy playing together.
24 seconds	I.2.B.1	I imitate the child playing a repeated single note. I play material from Burgmuller on the lower register.	The child watches while I play, he pushes my hand towards the low register of keys when I stop.	He starts to show preference of sound, pushes my hand to low register of sound. He watches attentively perhaps fascinated by the sound.

14 seconds	R.2.B.1	I play quietly.	The child watches while I play. When I stop, he pulls my hand to the piano.	Shows preference of sound and initiation in interacting.
16 seconds	I.2.B.1	I play rapid low sound.	The child watches and starts to pull my hand to the low sound and press the keys indicating me to play.	The child is able to engage in communicating to me what he wants.
20 seconds	I.2.A.1	I stop playing and using gesture to help the child to learn initiation. By showing him both my hands with simple verbal instruction and guides him to choose the sound that he wants.	The child plays on the piano however he starts to push my hand towards the range between F2 and C4.	I assume that that is the sound he wants and starts playing.
6 seconds	P.2.A.1	I support the child to press down the keys using palms.	The child tolerates input and watches while we play on the piano. He also smiles at the same time.	I am introducing different touch on the piano produce different sound. The child seems to enjoy the activity.
6 seconds	P.2.A.1	I support the child to play low register keys using his left palm. Using hand-over-hand, I let the child feels my hand moving on top of his.	The child tolerates the input and when I stop, he pulls my hand to the piano again.	The child initiates interaction by pulling my hand towards the piano again.

14 seconds	R.2.B.1	Continues to stimulate the child with the low rapid notes that the child has chosen himself.	The child watches and then starts to move his body with the sound.	He moves his body with the sound can be explained through early music and movement.
5 seconds	P.2.A.1	I observe.	The child starts to play on the keys using individual fingers.	He enjoys the production of sound.
28 seconds	R.2.B.1	Indicates by the child, I continue to play on the piano. And deliberately play higher sound to contrast with the sound before.	The child watches while I play but when I play high sound, the child pulls my hand towards the low register of keys. When I stop, the child pushes my hand down to play.	Here indicates that the child has a preference in sound. Every time, I stop, the child pushes my hand down to play. Here turns into turn taking or interaction between me and the child.
7 seconds	I.2.A.1	I prompt the child to play more by saying 'More' and wiggles my fingers.	The child plays a single note while I prompt but he starts to push my hand to play on the keys.	It seems that the child enjoys controlling my hand to produce the song rather than doing it on his own. Interaction takes place here when the child responds when I prompt him to take over.
12 seconds	R.2.B.1	I play high sound and wait for the	The child watches and smiles.	Expose the child with a new sound. He is

		child to respond.		attending to sound.
13 seconds	R.2.B.1	I play low sound on the piano.	The child watches and starts to vocalise. When I stop, he pulls my hand towards the piano and pushes my hand down to play.	Initiates interaction proactively.
14 seconds	R.2.A.2	I hold the child's hand to feel the movement.	The child tolerates the input but only for a short while.	Not very tolerable with input however enjoys the sound through listening and watching attentively.
7 seconds	R.2.B.1	I play high sound again to contrast the previous sound I made. This is to expand the child's knowledge that the piano is capable of making different sounds.	The child watches but he starts to pull my hand to low register indicates me to play there.	He attends the sound through watching and initiates interaction again which shows preference in sound.
44 seconds	R.2.B.1	(a) I play low and high rapid notes to the child again. (b) I move myself to the high register of the piano and start playing.	The child watches while I play and presses random keys while I am playing. The child smiles when I play high sound.	I try to communicate through sounds and gestures, trying to ask him which is his favourite sounds by playing contrasting sound. Not sure what is the intention, perhaps he wants to create sounds. The child seems to acknowledge new sound (high) and looks at me and smiles.

9 seconds	I.2.A.1	I continue to play high sound and stop deliberately and wait for the child to respond.	The child starts to press on the keys and looks at me. He then pushes me towards the low register range of the piano.	It seems that the child wants to communicate and when he pushes me towards the low register range of the piano, I am convinced now that the child prefers low sound.
10 seconds	R.2.A.1	I play repeated note for the child.	The child moves with the beat.	Early music and movement.
18 seconds	P.2.A.1	I hold the child's hand to play repeated notes.	The child tolerates the input and moves with the beat at the same time.	The child starts to understand the concept playing with one finger as he starts to play with one finger after.
12 seconds	R.2.A.1	I play low sound as indicated by the child.	The child initiates interaction by pushing my hands towards the piano and indicates me to play.	The child is proactively interacting.
19 seconds	P.2.A.1	I hold his hand to play repeated notes again.	The child tolerates the input and he starts to move his body with the beat as well. He is also smiling at the same time. When I let go of his hand, he starts to play repeated notes	One can see with appropriate support, the child is able to continue the task independently.

			without support.	
25 seconds	R.2.A.1	I continue to play repeated notes for the child.	The child watches and smiles. He vocalises when I stop.	The child is attending to sound.
15 seconds	I.2.B.1	I observe and imitate.	The child initiates interaction by pressing down keys with his palms.	This turns into a turn-taking activity. No imitation is taking place yet.
23 seconds	P.2.A.1	I hold the child's hand to play repeated notes again on the piano.	The child tolerates the input and his right-hand starts to play repeated notes as if it is imitating the left hand. When I stop, he pulls my hand to the piano and plays simultaneously with me.	Interesting interaction is taking place where the child starts to gain recognition of producing sounds on the piano and that he is able to initiate interaction by pulling my hand to the piano and starts playing simultaneously with me.
26 seconds	I.2.A.1	I play repeated notes again while the child is not looking. I wait for a response from the child.	After 10 seconds, the child starts to play. He then pulls my hand to the piano.	Perhaps delay in processing. He enjoys watching while I play. Imitation seems to emerge here as the child watches I play and after 3 seconds, he starts to play the same note, not always accurately but close.

14 seconds	R.2.B.1	I play low rapid sound again for the child.	The child watches and starts to move his body with the beat. He then pulls my hand towards the low register range of the piano.	I work on the assumption that the child wishes to hear the rapid low sound that he likes.
26 seconds	P.2.A.1	(a) The child starts to press down a repeated note using his right index finger. I then support him to play with his thumb this time. (b) And then support him to play rapid notes using hand-over-hand technique.	The child tolerates the input and watches attentively. He then starts to play on the piano keys using his right index finger.	Scaffolding is an important notion here.
25 seconds	R.2.A.1	I play low rapid sound.	The child pulls my hand to play low sound again. He then burst into laughter when I stop and vocalises in excitement.	At this stage, it is evident that the child shows preference in low sound and he will communicate what he likes through gesture.
12 seconds	I.2.A.1	I play another sound to observe how the child will respond.	The child responds through playing on the keys. He then pulls my hand to play low sound again.	Interaction takes place here but not imitation.

9 seconds	R.2.B.1	I play rapid high sound again.	The child watches.	The child is attending to sound.
49 seconds	I.2.B.1	I observe and play when he pulls my hand. I deliberately stop and allow the child to initiate interaction again.	The child pulls my hand to play low sounds. He initiates interaction by playing individual notes using both his index fingers. He pushes my hand to play every time I stop.	The child appears to enjoy the interaction.
31 seconds	R.2.B.1	I decide to provide contrast sounds for the child to experience.	The child moves with the beat and when I play high sound, the child pushes my hand towards low sounds.	The child shows a strong preference of sound.
15 seconds	P.2.A.1	I support the child to play an individual note.	The child tolerates the input and able to play without support after.	

1.16 minutes	I.2.B.1	I respond through imitating him.	The child initiates by pressing the keys with his palms again. When I stop, the child pulls my hand to the piano instructs me to play. He then starts rocking to the beat while I play. He will vocalise to interact if I play sound that he does not like and keeps pulling my hand until I play the sound that he wants.	This turns into a turn-taking activity. The child constantly initiates interaction and 'tell' what he likes and wishes me to play.
40 seconds	R.2.A.1	I play low sound for the child.	The child pulls my hand to the piano to play low sound again. The child moves his body with the beat.	The child is attending to the sound.
18 seconds	R.2.A.1	I play low sound again for the child.	When I stop, the child pulls my hand to the piano again.	The child is attending to the sound as he constantly looks at the piano.
1.08 minutes	R.2.B.1	I alternate low and high sound.	The child pulls my hand to play low sound. He rests his hand on mine to feel the movement.	He recognises the change of pitch when he looks at the source of the sound when the sound changes. He then initiates interaction by pulling my hand towards the sound he wants.

11 1.14 minutes	I.2.B.1	I respond through playing repeated notes.	The child initiates by making different sounds on the piano. First, he plays repeated notes with one finger and then with palms. The child prompts me to play.	The child takes on a more interactive role.
27 seconds	R.2.B.1	I play high sound.	The child watches occasionally but mainly not on task.	It seems that the child dislikes the sound therefore does not engage.
27 seconds	R.2.A.1	I play new sound – a chunk of chords.	The child moves with the sound and vocalises. He maintains eye contact with me.	The child is attending to sound and he appears to like the sound which is shown through his facial expression.
1 minute	I.2.A.1	I play a chord and deliberately stop and wait for the child to respond. I deliberately change sound from chord (3 notes) to single note.	The child responds through pushing my hand down onto the keys to play. He then vocalises when I stop. He then continues to push my hand down to play on the keys.	The child interacts with me by controlling the movement of my hand.

12 seconds	R.2.B.1	I stimulate the child with high sound.	The child watches and pulls my hand back to the low register range.	The child is attending to sound but shows preference on low sound.
1 minute	R.2.B.1	I use label to help the child to identify low sound.	The child constantly maintains eye contact with me. When I stop, he starts to push my hand down to play.	The child is attending to the sound and likes to initiate interaction.
1.16 minute	R.2.B.1	I play low sound (single pitch and chord).	The child is constantly pushing my hand around. When I play a single pitch, the child pushes my hand down. I assume the child likes chord sound. I deliberately play a high chord sound. The child immediately pushes my hand back to the low register.	The child seems to be communicating the sound that he likes and wants to hear.
1.04 minute	R.2.B.1	I use label to help the child to identify high sound and low sound.	The child looks at the piano but immediately pushes my hand back to the low sound. The child does not engage when I play high sound. He then vocalises and smiles and pushes me. He is looking at me most of the time.	The child is attending to sound however it is uncertain why the child behaves differently when I play high sound perhaps one explanation is that he dislikes the sound and is trying to communicate to me that he wants another sound.

20 seconds	I.2.A.1	I play a single low note and wait for the child to respond.	When I stop, the child starts to play. He maintains eye contact with me all the time.	Joint attention is the notion here. The child has gained familiarity and is comfortable to interact with me.
35 seconds	R.2.B.1	I hold the child's hand to choose between a single note or chord. And play alternatively between both and wait for the child to respond.	The child tolerates the input but not for long. He then looks at me and starts to smile.	The child is attending to the sound.
18 seconds	P.2.A.1	I support the child to continue to play repeated notes with the index finger.	The child starts to play repeated notes with his right index finger.	Scaffolding is essential at the early stages of learning. The child is able to produce sound independently with appropriate support.
31 seconds	R.2.A.1	I continue to stimulate the child with repeated notes.	The child smiles at me and watches attentively. When I stop, he pushes my hand down to play on the keys.	The child initiates interaction again.
9 seconds	I.2.A.1	I play a chord and wait for the child to respond.	The child watches and when I stop, he pushes my hand to play on the piano.	The child interacts and responds through controlling the movement of my hand.

20 seconds	P.2.A.1	I hold the child's hand to push down the keys. Here, my intention is to hope the child can proactively create sound on the piano and not just pushing my hand to create the sound.	The child tolerates the input. When I stop, he pushes my hand down to play the piano again.	The child enjoys controlling my hand movement.
37 seconds	R.2.A.1	I play repeated low notes for the child again.	The child watches and attentively. He then pushes my hand to play low sound again when I stop.	The child is attending to sound.
13 seconds	R.2.B.1	I play high and low sound again.	The child watches and when I play high sound, the child pulls my hand back to play low sound.	The child shows preference in sound by communicating through gesture.
1.04 minutes	I.2.B.1	I imitate in return.	The child initiates interaction by playing a single note repeatedly.	I am working on the assumption that the child is seeking a response. This then turns into turn-taking activity. However, no imitation is taking place here.
20 seconds	P.2.A.1	I deliberately stop and let the child	The child pushes my hand down to	The child learns to proactive produce sound

		intentionally pushes my hand down to produce the sound.	produce sound.	through controlling my hand movement. This is a good strategy for a child who has sensitive issues on playing the piano using their hands.
25 seconds	R.2.A.1	I continue to play repeated notes.	The child watches and engages through looking at me occasionally.	The child is attending to sound.
22 seconds	R.2.B.1	I play single note and chord for the child to choose which he prefers.	The child moves my hand to play repeated notes when I start playing repeated chords.	The child shows preferences in repeated single pitches rather than chords.
1.05 minute	R.2.B.1	I introduce another type of sound, two cluster of notes.	The child vocalises and moves my hand to indicate which sound he prefers. He holds my hand while I am playing. He then let go of my hand once I play the sound that he wishes to listen.	The child is able to communicate through gesture the sound that he likes.
12 23 seconds	I.2.A.1	I play a series of repeated notes and wait for the child to respond.	The child moves with the beat and when I stop, he starts to respond through playing on the piano.	Interactions is taking place here but no imitation has taken place yet.

27 seconds	P.2.A.1	I hold his hand and support him to continue to do so.	The child starts to press the keys repeatedly.	The child has already known how to produce sound, here I support him is to play longer as he has a short attention span.
16 seconds	P.2.A.1	I let the child pushes my hand down to make sound.	The child seems to reluctant to engage in playing on the piano for long but likes to control my hand to play on the piano.	Perhaps the child is sensitive to the piano.
18 seconds	R.2.A.1	I continue to play repeated sounds on the piano.	The child is constantly moving with the sound.	The child is attending to the sound.
1.15 minutes	P.2.A.1	I allow the child to push her hand down the keys to make sound.	The child is constantly pushing my hand down to play the keys.	Although the child is reluctant to produce sound on his own on the piano, using this strategy, the child is able to 'play' the piano through controlling my hand movement.
1.26 minutes	R.2.B.1	I want the child to choose between single pitch, cluster of 2 pitches and a chord (3 pitches). Using simple verbal instruction.	The child pushes my hand towards the sound he wants. He will then show his fondness through smile and vocalisation.	The child learns to communicate his preference of sound through gesture.

27 seconds	R.2.A.2	I continue to play a repeated cluster of two notes with an added bass line. New listening material for the child.	The child tolerates the input and moves with the sound. He vocalises and smiles as well. He pushes my hand to play when I stop.	The child is attending to sound.
40 seconds	R.2.A.1	I continue to stimulate the child with the same material.	The child moves his body with the sound. When I change to play high sound, the child immediately spots the difference and grabs my hand to play low sound.	The child is attending to sound.
24 seconds	P.2.A.1	I let the child to hold my hand to create sound.	The child constantly pushes my hand down to produce sound.	The vocalisation seems to mean that he does not like the sound. I make an assumption and experiment that the child may like the bass line that I played previously.
17 seconds	R.2.A.1	I play descending bass line A1# A1 G1.	The child moves with the sound.	The child is attending to the sound.
6 seconds	I.2.B.1	I play high sound on the piano.	The child lifts my hand and pulls my hand to the piano. The child pulls	The child is communicating the sound that he likes through controlling my hand

			my hand to play low sound.	movement.
2.12 minutes	P.2.A.1	I allow the child pushes my hand down to play the keys. I then support him to press down the keys.	The child is constantly pushing my hand down to play the keys. He enjoys making sound through my hand.	It is unknown why the child is reluctant to play on the piano himself.
23 seconds	R.2.A.1	I continue to play the repeated chords.	The child moves with the sound.	The child is attending to sound.
1.19 minutes	P.2.A.1	I then deliberately stop and let the child to hold my hand and push down the keys again. I also support him to play when he stops.	The child pushes my hand down to play and smiles throughout.	The child seems to enjoy the activity which is shown through his facial expressions.
13 seconds	R.2.A.2	The child rests his hand on mine to feel the movement of the hand.	The child tolerates the input and moves with the sound.	The child is attending to sound.
9 seconds	R.2.B.1	I then play high sound for the child.	The child moves with the beat and then stops and start to push my hand to low sound.	The child shows a preference of sound and communicates using gesture.

1.02 minute	P.2.A.1	I then let the child to hold her hand and push down the keys again.	The child controls my hand movement to press down the keys.	The child produces sound by controlling the movement of my hand.
8 seconds	R.2.A.1	I continue to play repeated notes.	The child moves with the sound. He then starts to show distress sign and wishes to get up and wander off.	Perhaps the session is too long for the child now.
12 seconds	I.2.B.1	I allow the child to control my hand to play on the piano.	The child grabs my hand and start to play on the piano.	The child initiates interaction.
6 seconds	R.2.A.1	I play a simple bass line with chords.	The child moves with the beat.	The child is attending to sound.
21 seconds	P.2.A.1	I allow the child to control my hand to play on the piano.	The child grabs my hand again and pushes down the keys.	The child is taking a proactive role in initiating interaction.
1.02 minute	I.2.A.1	I teach the child to choose the sound he wants. First, I deliberately stop and let the child initiates and then shows	The child seems to understand the concept as when I play only a chord on the right. The child starts to grab	The child learns to communicate sound that he likes through gesture.

		the child which hand to point if he wants the bass line or the chord.	my left hand, he stops and listens and looks at the piano. He then grabs my right hand to play the repeated chords. The child starts to move when I play both hands at the same indicating this is what he likes as he vocalises in excitement.	
21 seconds	R.2.B.1	I continue to play to stimulate the child.	The child rests his hand on mine and moves with the sound.	The child is attending to sound.
22 seconds	R.2.B.1	I play higher sound.	The child immediately smiles and looks at my hand. He then puts his hand to feel the movement.	The child is attending to sound.
24 seconds	I.2.B.1	I allow the child to communicate what he wants.	The child grabs my hand and presses down several keys across different range to find the sound he wants.	The child communicates the sound he wishes using gesture.
10 seconds	P.2.A.1	I allow the child to control my hand movement.	The child holds my hand to push down the keys.	The child produces sound through controlling my hand movement.

13 15 seconds	I.2.B.1	I take turn with him.	The child initiates interaction through pushing keys down with his right palm.	This turns into a turn-taking exercise.
17 seconds	P.2.A.1	I allow the child to control my hand to produce sound on the piano.	The child pushes my hand down to play the keys.	The child controls my hand to produce sound on the piano.
51 seconds	I.2.A.1	I continue to play and deliberately stop and wait for the child to respond.	The child encounters sound and from time to time he responds through playing but most of the time he seems distracted and stares on the piano. It seems like he is listening.	Perhaps the child is not in the mood of interacting.
20 seconds	R.2.A.2	I support the child with hand-under-hand to feel the movement of the source of the sound.	The child tolerates the input.	The child is attending to sound.
1.34 minutes	P.2.A.1	I support the child to press down repeated notes.	The tolerates the input and is able to play when I let go of his hand. The	Interaction between me and the child are intense, we tune into each other.

			child turns this into turn-taking activity as when I play, he stops, and when I stop, he plays	
5 seconds	I.2.B.1	This has then turned into a dialogue between the child and I. Like an imitation between two.	The child engages throughout.	I try to turn this into imitation as I imitate the child's playing. He seems to understand where he tries to imitate the exact note.
41 seconds	I.2.B.1	The activity continues.	The child takes turn with me.	The child seems to enjoy producing sound on his own. He is yet to realise I am imitating his playing.
19 seconds	P.2.A.1	I support the child to play two notes at the same time.	The child tolerates the input.	The child enjoys the production of sound on the piano now.
1.03 minute	P.2.A.1	I deliberately imitate the child again with the pattern of four repeated notes.	The child stops and listens. The child starts to smile after the fourth time I play the wrong pitch.	Emergence of recognising patterns and pitches.
56 seconds	P.2.A.1	I observe.	The child creates sound on his own.	No interaction is taking place here.

11 seconds	I.2.A.1	I play a cluster of notes for the child.	The child responds through playing but only a short period.	The child appears to be distracted.
8 seconds	P.2.A.1	I support the child to press down the keys.	The child tolerates the input.	
12 seconds	P.2.A.1	I observe.	The child starts playing without support.	
5 seconds	I.2.B.1	I respond through playing.	The child initiates through playing with the fingers, pulls my hand to the piano and then presses the keys with his palm.	This turns into a turn-taking activity.
11 seconds	R.2.A.1	I start to play a series of chords with a simple bass line that the child listened previously.	The child watches.	The child is attending to sound.

14 seconds	R.2.A.2	I continue to play for the child.	The child pulls my hand to the piano and rests his hand to feel the movement.	
3 seconds	I.2.B.1	When I stop, the child pulls my hand to the piano and starts to vocalise.	Once again, the child initiates interaction and communicates to me that he wants me to play.	Initiates interaction.
47 seconds	R.2.B.1	I let the child to choose the sound he wants again.	The child holds my hand and pushes my hand towards the sound he wants. I play. Judging from his smile and eye contact, I know that I am playing the sound that he wants.	The child communicates through gestures.
41 seconds	R.2.B.1	I help the child to choose the sound he prefers.	The child watches attentively.	The child is attending to sound.
12 seconds	I.2.B.1	I allow the child to control my hand.	The child initiates and pushes my hand to play repeated chords.	Initiates interaction.

17 seconds	R.2.B.1	I expand the child's listening experience. Include the fourth note now. The child rests his hand on mine to feel the movement.	The child tolerates the input and watches.	The child is attending to sound.
43 seconds	P.2.A.1	I let the child to push my hand down on the keys.	The child pushes my hand down again to produce sound.	The child enjoys producing sound through controlling my hand movement.
37 seconds	P.2.A.1	I let the child to push my hand down on the keys.	The child pushes my hand down again to produce sound.	
7 seconds	P.2.A.1	I let the child to push my hand down on the keys.	The child pushes my hand down again to produce sound.	
1.13 minute	R.2.B.1	I allow the child to control my hand to show me the sound that he wishes to hear	The child chooses the sound he wants again by pushing my hand around the keys.	The child smiles when I play the sound that he likes.
13 seconds	R.2.A.1	I play repeated chords with simple bass line — repeated material that the	The child vocalises in excitement and moves with the sound.	The child is attending to sound.

		child listens previously.		
11 seconds	I.2.B.1	I allow the child to control my hand to show me the sound he likes.	The child pushes my hand towards the sound that he wants.	The child communicates using gesture.
10 seconds	R.2.A.1	I continue to play.	The child moves with the beat.	Move his body with the sound.
15 seconds	P.2.A.1	I let the child push my hand down on the keys.	The child pushes my hand down again to produce sound.	The child enjoys producing sound through controlling my hand movement.
7 seconds	R.2.A.1	I continue to play the same material.	The child moves with the sound but distracted and starts to pull my hand away from the piano.	Perhaps the child is starting to get tired.
23 seconds	I.2.B.1	I interact and respond through playing low sound.	The child initiates and pushes my hand to play the sound he wants.	The child shows excitement through vocalisation and smile.
11 seconds	P.2.A.1	I allow the child to control my hand movement.	The child pulls my hand to the piano and pushes my hand down the key to play.	The child enjoys the production of sound through controlling the movement of my hand.

20 seconds	R.2.A.1	I continue to play when the child let go of my hand.	The child moves his body with the sound.	The child is attending to sound.

Appendix 10 – Child 4

Child 4

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 1.15 min	R.2.A.1	I make a range of sounds on the piano. First, start with a cluster and then leaves ample time for the child to respond before making another sound (gliding the keys up and down on the piano).	The child engages by looking at the movement of my hand on the piano. He smiles which suggests encountering the sound.	I notice the child smiles every time I glide the keys up and down. He is looking attentively at the movement my hand gliding up and down the keys. This suggests that the child is encountering sound and acknowledging that he likes the sound as, at the fourth time, the child reacts by pressing the keys which seems to try to imitate me.
41 seconds	P.2.A.1	As the child is keen on making sounds on the piano. I support the child to make sounds on the piano by holding his hand to press down the keys.	The child tolerates the input.	The child seems to enjoy making sounds on the piano and allows me to support him. He is constantly looking at his hand while I am supporting him to press down the keys.
1.10 min	P.2.A.1	I support the child to make sounds on the piano again.	The child tolerates the input.	

		It was a very short session as the child begins to run around the room and then decides to run back to the class. As it is the first session for the child, I understand the child needs time to be familiarised with me and the session. The teaching assistant mentions that the child has very short attention span with ADHD and if he shows sign of 'excitement' or agitation, the activity should stop as he will bite or scratch when he gets too excited.		
2 25 seconds	R.2.B.1	I start the session by playing contrasting sounds to the child. This is to see if the child will respond to the sound differently.	The child covers his ears when loud sounds are being played.	No responses are shown when other sounds are made on the piano beside loud sound. It shows that the child may be sensitive to loud sound.
18 seconds	P.2.A.1	I then support the child to press down the keys as they did on the previous session.	The child tolerates the input. He manages to play on his own when I let go of my hand and prompts the child to play by himself.	The evidence shows that appropriate support can lead to the child in successful producing sounds on his own which meets the success criteria set out in the piano framework.
55 seconds	I.2.A.1	As the child has grasped the concept of producing sounds on the piano, I progress to interact with the child using the piano. This is known as an interactive play where the child and I play the piano with turn-takings. I play a cluster of sounds on the piano and allows ample time for the child to respond.	The child responses to the sounds by pressing cluster of keys on the piano and then waited for me to respond. This activity prolongs for almost a minute.	At this stage, I am assuming that the child is waiting for a response as he is looking at me after he pressed the keys. The child always responds to the sounds made by me which shows that the child starts to understand the concept of cause and effect. Joint attention is the notion here which involves two participants actively

				sharing attention towards an object and monitoring each other's attention towards that object (Jones & Carr, 2004).
15 seconds	I.2.B.1	I decide to switch the role and let the child to initiate the activity. I want to observe if the child has come to appreciate or show awareness that they are responding to each other through making a sound on the piano. When the child presses down the keys, I deliberately not to respond and observe how the child will react.	When I fail to respond to the child's playing, the child looks at me and then grabs my hand towards the piano and asks me to play.	The gesture shows that the child is aware of the activity that he is playing with me. The fact that he is seeking a response to the sound he makes shows that the child is aware of the cause and effect of the activity he is playing with me. Research suggests that joint attention behaviours are observed more often in children with ASC when music stimuli are present (Arezina, 2011; Yoo, 2010).
41 seconds	R.2.B.1	I then play different qualities of sound to observe how the child reacts to them.	Once again, the child covers his ears when I play loud sounds. When I play quieter sound, the child puts his hands down.	This shows that the child is sensitive to loud sound. This may also mean that the child can differentiate two different qualities of sound – loud and quiet.
19 seconds	I.2.A.1	As the child shows sign of musical development of level 3 of SoI, I decide to make some progress by	Before I stop, the child immediately joins in and presses a repeated key (different from me) on the piano. This is then turning into playing	The child seems to start to imitate my playing. Despite not imitating the exact key, he is able to play repeated key continuously without prompting

		playing repeated notes on the piano.	simultaneously with me.	from me.
35 seconds	R.2.B.1	When the child stops playing, I decide to play loud and quiet sounds on the piano again to observe the child's reactions again.	The child smiles when I start playing on the piano. He laughs and flaps his hands. However, when I increase the dynamic of the sound, the child covers his ears and puts his hands down when he hears me plays quietly.	At this stage, I am certain that the child is able to distinguish two different qualities of sound – loud and quiet.
42 seconds	P.2.A.1	I then support the child to play different sounds on the piano, loud and then quiet by holding his hands so he can feel different forces in producing the sounds.	The child tolerates the input. When I let go of his hand, he is able to produce sounds on the piano without prompts or support however there is no dynamics (loud/quiet).	The child is yet to understand how to produce different qualities of sounds on the piano.
18 seconds	R.2.A.1	As mentioned above, the child shows good responses to the strategies implemented for level 2, I decide to expand the materials to level 3. I play a repeated C for the child to listen.	The child looks at the piano and smiles throughout when I play repeated C on the piano.	It seems that the child enjoys the simple pattern played on the piano. The facial expression from the child also indicates that he is attending to the sound.
36 seconds	P.2.A.1	I then decide to stop and prompt the child to play. I want to see if the child will copy and play the note C that I	The child does not play note C but he plays a cluster of high register notes	The child is able to play with regular beat shows indicates that he is progressing towards level 3 of SoI.

		have been playing before. When the child looks at me, I assume that he wants me to play on the piano. I then join in playing repeated C on the piano with a regular beat.	repeatedly and then he looks at me. The child engages by playing a cluster of keys with regular beat together with me.	Clayton, Sager and Will (2004) described the formation of a regular pulse in the mind of the listener that is cognitively and synchronised with movement is through the process of 'entrainment' which pulses interact.
19 seconds	R.2.A.1	I continue to play repeated sounds on the piano.	The child observes and listens.	
12 seconds	P.2.A.1	I hold the child's hand to play repeated notes on the piano.	The child tolerates the input. However, he is not looking at the piano. He is looking around the room.	It seems that the child's attention is starting to reduce.
26 seconds	R.2.B.1	To draw the attention of the child, I decide to make different qualities of sound (high and low sound) gliding the keys from the bottom to the top.	The child's attention is being drawn to the sounds as he watches throughout attentively, and his eye gaze follows the movement of my hand, up and down the keys.	It seems that the child likes the sound of gliding keys on the piano.
1 minute	R.2.A.1	I continue to make a range of sounds on the piano: quiet, loud, gliding keys, a cluster of notes for the child to	After 30 seconds, the child starts to join in and starts to make a cluster of sounds on the piano.	It seems like the child is responding to the sound from the piano and he enjoys making sounds on the piano.

		listen.		
4 32 seconds	R.2.B.1	I start the session by making a range of differentiated sounds on the piano. I play fast and slow.	The child first looks at the playing and smiles. However, his attention is attracted by the sticker labels on the piano and starts to play with them.	At this instance, it is difficult to deduce if the child is listening. He is encountering the sound but due to his short concentration span or distraction from the sticker labels, it seems that he is not attending to the sounds I am playing.
28 seconds	R.2.B.1	I decide to try again by playing fast notes.	This time, the child responses to the sounds through smiling.	
46 seconds	R.2.B.1	I then change to another sound, high sound (like birds chirping). I play the sounds for six times with ample time in between for the child to respond.	The child only responds three out of six times. He reacts through smiling and looking at me. At other times, he is looking around the room.	It seems that the child is feeling slightly distracted today.
31 seconds	R.2.B.1	I then make a contrasting low sound on the piano.	The child looks at me occasionally but most of the time he is looking around the room.	Here, the child is encountering the sound but does not seem to be attending to it.

27 seconds	R.2.B.1	I continue to play low sounds on the piano.	Halfway through, the child grabs my hand while I am playing.	It is unknown what is the intention; perhaps the child is acknowledging me that he is aware of the sound she is making, or he is trying to feel the movement of the hand.
		The child seems to be very distracted today. He is constantly tearing the sticker labels from the piano and I have to stop him from doing that which disrupts the session constantly.		
40 seconds	R.2.B.1	I decide to change to playing high sounds which contrast to the previous sound.	The child is neither looking at the piano nor me. He is looking around the room and then runs off.	The child is very agitated today.
55 seconds	P.2.A.1	I decide to change strategy and hold the child's hand to support him to press down the keys. I explore using different touches to play the keys. First with a gentle touch and then with banging on the piano.	The child tolerates the input. While I support the child to play gently on the piano, the child starts to vocalise when I change to banging on the keys, the child smiles.	It is uncertain why the child vocalises when I support him to play gently on the piano. Perhaps he is trying to convey that he does not like the sound. As one can see that he likes the banging touch on the piano as he smiles when I support him to bang on the piano.
		I suspect that the banging and loudness of the piano triggers the child to be overexcited or agitated thus leading him to		

		start beating himself and starts to scratch me as well. The session has to pause while I try to calm the child down.		
25 seconds	R.2.B.1	Once the child has calmed down, I decide to make a range of differentiated sounds on the piano, ranging from loud to quiet.	The child engages through looking although not throughout the event. While I play a loud sound, the child looks at me. When I stop, the child starts to press down the keys on the piano.	It seems that loud sound has attracted the attention of the child. Here, it shows that the child is capable of making sounds on his own without support my support. Perhaps my playing has stimulated him to make sounds on the piano.
29 seconds	P.2.A.1	When the child stops, I support the child to play repeated note G on the piano using hand over hand.	The child tolerates the input but not consistently throughout.	It seems that the child's attention is still distracted.
29 seconds	R.2.A.1	I continue to play repeated notes for the child to listen.	The child vocalises and looks at the piano while I am playing but not consistently throughout.	
54 seconds	R.2.B.1	I then play contrast sounds on the piano (loud and quiet).	First, the child looks at the piano while I am playing but then starts to lick the keys and to tear out the sticker labels.	The child's attention is distracted by the surrounding.

21 seconds	P.2.A.1	I decide to draw his attention back by supporting the child to make sounds on the piano. I support the child to play repeated note C.	The child tolerates the input and when I let go of his hands, the child plays repeated note C without the my help or prompts.	It seems that the child is progressing to level 3 of SoI making a simple pattern on the piano.
		The child starts to lick the keys again and the sessions have to pause as I have to stop him from doing that.		
15 seconds	R.2.B.1	To draw his attention back to the piano, I play low sounds on the piano.	The child vocalises and looks at the piano occasionally.	The loud sounds successfully attract the attention of the child however the child's attention does not stay throughout.
1.08 minute	R.2.A.1	I continue to play a series of chords on the piano at the low register with a steady beat.	The child is not attending to sound. He is looking around the room. Occasionally he will look at the piano and join in by pressing the keys however only last for 1-2 seconds.	It seems that the child is still distracted. Perhaps today he is not at his best performance.
30 seconds	R.2.B.1	I then play contrasting sounds (loud and quiet) on the piano and observe how the child reacts.	The child recognises loud sounds by covering his ears.	Once again, the child covers his ears when encountering loud sounds.

		The child runs off again and I have to chase him back and bring him to the piano to resume the session.		
20 seconds	P.2.A.1	I support the child to make a cluster of sound on the low register of the piano.	The child tolerates the input.	The child seems to calm down and participate in the activity.
20 seconds	R.2.B.1	I then try again to play contrasting sounds.	The child covers his ears when encountering loud sounds.	Similar experience when encounter loud sound – covers ears.
29 seconds	I.2.A.1	I seek a response from the child. I initiate a response by gliding the keys up and down and waits for the child to respond.	The child observes and he starts to imitate me by gliding the keys from the bottom to the top. He then runs off again.	Here, it shows that the child starts to imitate my pattern which indicates he is moving towards level 3 of SoI. As he runs off again, the session has to end at this point.
5 1.08 minute	P.2.A.1	I continue the materials from the last session. I play rapid low register chords to elicit a response from the child. I then stop and prompt the child to play.	The child tries to imitate my gesture, playing rapidly. However, the child is distracted and does not stay on the task consistently.	The child seems to be dealing with the transition of task (from classroom to piano session). He is not settled down and is constantly feeling agitated and looking around the room.
49 seconds	P.2.A.1	I try again by playing a series of chords with a regular pulse.	The child joins in by pressing the keys with the right pulse.	The child starts to settle down and engages on the task with me.

		The child then feels agitated again and this time, he pulls the piano's plug off.		
33 seconds	R.2.B.1	I decide to change strategy by playing a range of sounds on the piano, loud and then quiet.	The child is not engaged on the task. No evidence of responses is shown. He is looking around the room.	The child is encountering the sound but not attending to the sound. It seems that he is distracted but I have no idea what it is.
30 seconds	P.2.A.1	To draw his attention back to the piano session, I decide to encourage the child to make a sound on the piano. I support the child to play a single note on the piano.	The child tolerates the input. However, when I let go of his hand and prompt him to do it on his own, the child starts to take the sticker labels off the piano instead of playing on the keys.	The child is distracted by external stimuli (the sticker label).
25 seconds	R.2.B.1	I decide to change the sound. I start to glide the keys as the child shows an interest of the sound from the previous session.	The child is still distracted by the sticker labels and starts to eat the papers that he tore up from the piano.	
20 seconds	R.2.B.1	I change to another sound in hope to stimulate a response from the child and to draw his attention back to the piano. I play high register sound	The child looks at the piano and starts to smile. He then joins in with me by pressing the high register keys.	Here, the evidence shows that the child's attention is drawn back to the piano and that he is attending to the

		simulate bird chirping.		sound made by me.
		The child runs off again.		
15 seconds	R.2.B.1	The session resumes and I play high sounds again but with a crescendo.	The child covers his ears when I play louder on the piano.	The evidence once again shows that the child may be sensitive to loud sound. Or it can be that his dislike of loud sound triggers him to cover his ears to block the sound that I played.
34 seconds	P.2.A.1	I glide the keys again and waits for the child to respond.	The child looks and attempts to copy my movement. However, he seems to struggle in producing the sound and so he stops. I then support him by holding his hand to glide the keys, he tolerates the input and manages to glide the keys on his own.	It shows that by providing appropriate support, the child is able to produce sounds independently. This is in line with the idea of scaffolding (Vygotsky, 1978) which an adult first scaffolds the child before proceeding in creating the materials alone.
20 seconds	I.2.B.1	When the child makes a sound on the piano, I decide to reinforce his learning of the concept of cause and effect. I do not immediately respond to the sound made by the child. I want	When I fail to respond, the child seeks a response from me by grabbing my hands towards the piano to ask me to play.	Here, the child is seeking a response from me which shows that he starts to understand the notion of joint attention.

		to see what the child will do next.		
		The child's attention is distracted again and starts to lick on the piano.		
1.10 minutes	P.2.A.1	I change strategy to draw the child's attention back to the piano. I hold the child's hand to press the keys from high to low sounds. I continuously play the pattern four times.	The child tolerates input but not always. Halfway through the activity, he retracts his hand from me. I try again for another three times. Towards the end of the task, when I let go of the child's hand. The child starts to press the keys from high to low sounds on his own.	The evidence shows that the child is capable of producing sounds initially with my support and then proceeds in creating the exact sounds by himself.
25 seconds	R.2.A.1	As the child's attention seems to be fading, I decide to end the session by playing simple pattern, C chord with a regular pulse to the child to listen.	The child does not engage throughout. His concentration starts to reduce. Occasionally he will look at the piano when I am playing but most of the time he is just looking around.	It is clear that the child cannot focus on the session anymore. I decide to stop the session for today.
8 18 seconds	I.3.B.1	I play a note C on the piano and waits for the child to respond. I continue to play C on the piano and every time I allow ample time for the child to respond.	The child responds by playing the exact note. The child always responds by imitating the same note.	From the previous sessions, the child shows massive improvement from session to session regarding musical development. I notice that the child is moving towards Level 3 of SoI and therefore I decide to implement

				strategies from level 3 to help the child to progress forward. Here, the development of imitation skill starts to emerge. The child is able to imitate the exact note played by me.
10 seconds	I.3.C.1	The child plays a note G on the piano. I deliberately imitate the note played by the child and waits to see if he recognises others are now imitating his own pattern.	The child is neither looking at the piano nor me. The child is not reacting to my playing. He is unaware of me imitating his sounds.	The child is yet to recognise his own pattern/sound being imitated by others. This may result due to the deficit of joint attention of children with ASC.
		The child wants to run off again. I manage to stop him from doing so. In order to prevent the child in running away again, I decide to change strategy where I can hold the child's hand to play on the piano.		
32 seconds	P.3.A.2	I hold the child's hand to make a simple pattern on the piano (playing repeated C on the piano). I repeat the task four times with a pause in between.	The child tolerates the input throughout. When I let go of his hand, the child does not play repeated note C but a cluster of note.	The child is yet to develop skill in making a simple pattern on the piano. I understand that the activity is new and that it is through constant repetition for the child to develop the skill and concept.
13 seconds	I.3.C.1	I then imitate the child after he played the cluster of notes. This is to see if	The child is neither looking at me nor the piano. He is looking around the	The child is unaware his sound is being

		the child recognises his sound being imitated.	room again.	imitated.
35 seconds	P.3.B.1	I then proceed in playing C major chord (chord picking) by forming a regular beat. I am also looking at the child to observe his reaction.	The child starts to press a key (note E) repeatedly forming regular pulse with me. He then changes to playing a cluster of notes (like me) and then starts to knock on the piano. However, he is constantly keeping the same pulse as me.	The child comes to appreciate that music is made up of a regular beat. He is able to match the pulse played by me and maintains throughout.
22 seconds	R.3.A.1	I continue to provide vast listening experience to the child by copying his materials forming simple patterns on the piano. First repeated E and then a cluster of notes.	The child listens attentively and constantly looking at the piano.	The child is attending to the simple patterns that I played.
		I observe.	When I stop, the child starts to glide the keys up and down for two times and then he starts to play a repeated note A on the piano with a regular beat.	The child starts to create his simple pattern on the piano. He seems to be enjoying doing it.
12 seconds	I.3.B.1	When the child stops, I play a repeated note G and wait for the child to	The child imitates the repeated note in return. This continues for about 10	A short call and response moment emerges here where the child and I

		respond.	seconds.	interact with each other through imitating the same note.
		After a short while, the child decides to run off again.		
15 seconds			When the child is back on the piano, he starts to create a simple pattern without any physical prompt from me. He starts to play repeated note D on the piano.	The child has already started to develop the skill in creating a simple pattern on the piano.
36 seconds	P.3.A.3	When the child stops, I decide to hold the child's hand to continue to create a simple pattern on the piano however the child refuses it. I then change strategy by cueing the child to continue to play by pointing on the keys and use gesture to prompt the child.	The child looks at me and starts to play repeated note C on the piano when I prompted him to do so.	Research shows that some children with ASC exhibit tactile defensiveness in which the child avoids a variety of tactile experiences. Here, the child is not tactile defensive, but he is avoiding the sensation of touch or reluctant to let me hold his hand. Therefore, I change strategy by providing cues to direct the child to create patterns on the piano. This allows the child to avoid tactile sensitivity and still able to learn to create simple patterns.

		The child then stops and runs off again.		
24 seconds	P.3.A.2	I hold the child's hand to play repeated note C.	The child tolerates the input and when I let go of the child's hand, the child creates repeated note on the piano however not the same key.	The learning objective is to learn to create repeated notes and therefore I do not expect the child to play the same note. The child has accomplished the task by creating repeated notes without my help.
35 seconds	I.3.B.1	When the child stops, I play repeated note G and deliberately stop for the child to imitate and repeat the task four times.	The child successfully imitates three out of four times.	The evidence shows that child four is developing his imitation skill and that he is able to imitate without prompts from me.
23 seconds	P.3.A.3	When the child stops, I prompt the child to play another simple pattern on the piano. I point to a key for the child to play.	The child creates his simple pattern first by gliding the keys up and down and then he starts to play repeated note D on the piano.	Although the child is not following my prompt, one can see that the child has already developed the skill in creating simple patterns of his own.
32 seconds	I.3.B.1	I continue the session by playing repeated D on the piano as well. I play a little too loud on the piano.	The child covers his ears when the I play too loud on the piano. This shows that the child recognises the quality of sound has changed. When I stop, the	The child reacts to the change of quality of sound (covering ears when encountering loud sound). He is also able to imitate my playing which

			child imitates the same note in return. This prolongs three times before the child's concentration starts to reduce.	shows that his imitation skill is improving.
1.05 minute	P.3.A.3	I then prompt the child to create a simple pattern on the piano again by pointing at the keys.	Again, the child starts to glide the keys up and down consistently for about 30 seconds. He then starts to play a repeated note on the piano after. This time is a repeated G flat.	The child is able to create a simple pattern without any physical support from me. It seems like he starts to understand the cue and is able to create simple patterns on his own. There is also a pattern emerge from his creation.
34 seconds	I.3.B.1	I then deliberately play another note on the piano (note F) and wait for the child to imitate in return.	The child imitates once and when I repeat the task, the child runs off.	The child's attention starts to fade.
14 seconds	P.3.A.3	When the child is back on the piano, I prompt him to create simple pattern again.	This time, the child plays a cluster of notes repeatedly.	
54 seconds	I.3.C.1	I then decide to imitate the child by playing a cluster of notes repeatedly and waits for the child to respond. I	The child is looking at me, but no evidence shows that he is aware that his sound is being imitated. He is looking around the room occasionally and he	It is unclear whether the child is aware of his sound being imitated as there is no evidence shows that he recognises

		repeat the pattern a couple of times.	glides the keys up and down, but it only happens once.	his sound being imitated.
1.09 minute	I.3.B.1	I then change the strategy by making another pattern by gliding the keys up and down. I change the pattern to play repeated note D on the piano and pause for the child to imitate.	The child looks at me and then starts to glide the keys up and down. The child does not respond and is looking around the room. I try a few times. The child responds by playing a repeated note on the piano but not on the right key. When I try again, the child pushes my hand away.	It seems like the child is getting tired and that his attention starts to sway away.
28 seconds	R.3.A.1	As the child shows sign of low concentration, I decide to stimulate the child by playing simple patterns for him to listen. I play repeated note D on the piano on a different register.	The child seems to be listening attentively as he is constantly looking at the piano. When I play repeated note D on low register, the child covers his ears indicating that he recognises the sound that he dislikes.	The child notices change of quality of sound (especially low register and loud) where he starts to cover his ears.
14 seconds	P.3.A.3	I then prompt the child to create patterns on the piano.	The child plays repeated note A on the piano.	Once again, it shows the child is able to create a simple pattern without my help.
43 seconds	R.3.A.1	When the child stops, I decide to	The child listens and watches. He	It seems that the child is attending to

		expand the materials by introducing different patterns. I play a short descending scale (G, F, E, D) several times.	occasionally smiles as well.	my playing which is shown in his expression.
		Halfway through the activity, the child runs off again and I decide to end the session as I notice the child is not focusing on the session anymore.		
9 50 seconds	P.3.B.1	I start the session by playing C major chord (chord picking) with a regular beat.	The child joins in by pressing the pedals with his feet with regular beat that matches the pulse that I am playing.	The child seems to enjoy the rhythmical activity. Although the child does not play on the piano, he is moving his feet (pressing the pedal) at the same regular pulse as me.
14 seconds	I.3.B.1 P.3.A.2	I then play a note G and wait for the child to imitate. I then combine the strategy with P.3.A.2 where I play a note G and then holds the child's hand to imitate the note G. I repeat the task for three times.	The child does not imitate in return. After three times, when I let go of the child's hand, the child imitates the same note without any physical support.	Here, it shows that strategies can be combined to scaffold the child to learn imitation.
14 seconds	I.3.C.1	I then deliberately imitates the child	The child looks at me and then looks	No evidence shows that the child is

		and waits for his response to see if the child recognises his sound being imitated.	away.	aware of his sound being imitated.
1.02 minute	P.3.A.2	I change strategy and expand the materials the child is learning. I hold the child's hand to play a middle C and then an octave higher C. I repeat the task for five times.	The child tolerates the input and when I let go of the child's hand, the child is able to play a middle C and then a high C.	This shows that with support and repetition of the task, this can lead to the child succeeds in learning different patterns on the piano.
		The child starts to get distressed all of a sudden and suddenly scream out loud. The session has to stop to calm the child down.		
25 seconds	I.3.C.1	I imitate the child's pattern and wait to see if the child recognises.	When the session is resumed, the child starts to create a series of repeated note D on the piano. When I am imitating the child's pattern, the child runs off again.	It seems that the child is feeling unsettled today and this has affected his performance of the session.
26 seconds	R.3.A.1	I play a pattern (descending scale G, F, E, D) from previous sessions to see if the child is able to recognise.	The child looks at me and smiles.	At this instance, it is unclear if the child recognises the pattern. I am assuming the child recognises the pattern as he smiles at me when I am

				playing.
48 seconds	I.3.B.1	I proceed to play the starting note of the descending scale (note G) and pauses for the child to imitate. I do it again but this time I accidentally hammer the key while playing the note. I then demonstrate it again.	The child shows no response. The child starts to imitate my movement by hammering the keys, dropping his arm from a high point but hitting the wrong note. The child imitates again but with the correct note this time. He does it consistently four times with the accurate note.	The child does not respond at first may due to delay in processing the information. As one can see that, when I repeat the task, the child is able to imitate me. Perhaps the hammering of the keys from the researcher triggers interest from the child.
34 seconds	I.3.B.1	I decide to change the material slightly to see if the child notices the change and will imitate accurately. I play a different register of the note.	The child notices the change of the register and moves his hand to play the same D as the register.	The child has developed good imitation skill.
25 seconds	R.3.A.1	I continue to play repeated D on different registers.	The child's attention starts to drop as he starts to feel agitated and rocking his body trying to get up from the chair. Occasionally he looks at the piano when I am playing but most of the time he is just looking around.	Perhaps the child starts to feel tired or that he needs a break from the session.

40 seconds	I.3.B.1	I change strategy as the child seems to be not able to listen attentively. I play three repeated D on the low register and pause for the child to imitate. I then play again.	When I stop, the child starts to press keys at the lower register three times. It seems that he is trying to imitate me. This time, the child is able to imitate accurately. The activity turns into a turn taking exercise where the child imitates me and vice versa.	Call and response activity occurs here where the child and I are interacting with each other through imitation.
25 seconds	R.3.A.1	I change materials by playing repeated low register chords.	First, the child looks at the piano, he then immediately covers his ears.	The low register chords might be too loud, and that the child is sensitive to the sound.
39 seconds	I.3.B.1 P.3.A.2	Since the child dislikes the sound of the low register chord, I change strategy to playing repeated C again and pauses for the child to imitate. I hold the child's hand to play repeated C.	The child does not imitate in return. When I let go of his hand, the child imitates the exact note. This prolongs for 30 seconds. It seems that the child and I are playing imitation game.	Call and response activity to enhance imitation skill. Combination of strategies is used to scaffold the child to imitate the exact note.
40 seconds	P.3.A.2	When the activity stops, I hold the child's hand again to play repeated note C.	The child tolerates the input but halfway through the activity, he pushes my hand away and runs off.	I notice that the child is feeling distressed and getting tired. Therefore, I decide to end the session.

10 20 seconds	R.3.A.1	I play repeated notes on the piano for the child to listen.	The child looks attentively, and he attempts to copy me by playing the keys on the piano. However, the notes are wrong.	The child seems to be keen on playing on the piano.
27 seconds	P.3.A.2	I hold the child's hand to play the repeated notes.	The child tolerates the input and when I let go of his hand. The child is able to play the pattern without my help.	Here shows the importance of scaffolding in the learning process. The child was playing wrong notes and after my support, the child is able to play the pattern accurately.
17 seconds	R.3.A.1	I demonstrate the pattern again.	The child is neither looking at the piano nor me. He starts to move around showing sign of distress.	It seems that the child is still coping with the transitioning of the task (from classroom to piano session). The child gestures with his hand indicate he wants to go but I have to say no and ask him to continue. He then decides to run away.
42 seconds	I.3.B.1 P.3.A.3	I use physical prompts to cue the child to imitate the patterns that I am playing.	The child follows my cue and imitates the patterns accurately.	Here shows that prompting is useful in directing the child to imitate or play accurately.

		The child suddenly stands up and wants to run away again. I manage to get a hold on him before he runs off.		
11 seconds	I.3.B.1 P.3.A.3	I manage to get him back to the piano and continue to use physical prompt in assisting the child to imitate the pattern.	The child stays on the task but not for long, after 5 seconds, the child starts to bang on the piano indicating he does not want to continue with the task.	It seems that the child is having a behavioural issue today. However, he manages to perform the task when instructed although not consistently throughout.
14 seconds	P.3.A.2	I decide to hold his hand to create the pattern (repeated note C) on the piano as the child seems to be wanting to run away again.	The child tolerates the input and looks at the piano when performing the task together with me.	The child is able to stay on task when I hold his hand.
5 seconds	P.3.A.3	I then let go of his hand and prompt him to play the repeated notes.	The child engages on the task and plays the repeated notes when I prompted.	Here shows that when the child is focused on the task, he can perform well. This means that the child is capable of performing the task and it is the external factors (mood swing, behavioural issues, etc) that cause him to be off task.
		The child's attention sways again and starts to move around and trying to shake the piano. He seems agitated and starts		

		to press on the pedals consistently.		
9 seconds	R.3.A.1	I decide to play a simple rhythmic pattern that matches to the child's beat pressing on the pedals.	The child looks at me without any facial expression.	It is uncertain at this point to determine if the child recognises I am playing the same beat as him.
		The child pulls the plug off the piano again.		
14 seconds	P.3.C.1	Here, I introduce a new strategy and concept. I introduce regular changes that can be achieved using the patterns they have learnt previously. Using hand-under-hand, I help the child to recognise patterns by playing same note C up and down the piano.	The child tolerates the input at first and looks at the piano while I introduce playing C up and down the piano. However, halfway through the task he pulls his hand away.	Perhaps the child does not like the sensation of touch? Or it may be the child loses his attention again.
13 seconds	P.3.C.1	I try again.	The child tolerates the input throughout and looks at the piano.	It seems that the child needs time to settle into the task.
9 seconds	P.3.C.1	I try again but instead of using the hand-under-hand technique, I hold his hand to press down the keys with his	The child tolerates the input and looks at the piano throughout.	

		finger.		
18 seconds	P.3.C.1	I continue to reinforce the strategy.	The child tolerates the input and looks at the piano. However, after 12 seconds, the child lifts his left hand and stares at it.	It is uncertain why the child is behaving in such a way. I assume that the child wants to play with his left hand since he lifts the hand and stares at it.
18 seconds	P.3.C.1	I decide to support him to play with the left hand.	The child tolerates the input throughout.	
		The child suddenly stands up and wants to run away but I manage to get him back to his seat.		
10 seconds	R.3.A.1	I play a simple pattern (repeated note C) for the child to listen.	The child looks at the piano when I am playing.	The child is attending to the sound I played.
11 seconds	P.3.C.1	I use hand-under-hand technique again to help the child in playing note C up and down the octave.	The child tolerates the input.	The child manages to stay on task however it is yet to know if the child is able to create a simple pattern with regular change on his own.
		The child runs off. I manage to get him to come back to the piano. He starts to bang on the piano.		

15 seconds	I.3.C.1	While he is banging on the piano, it seems that a simple pattern emerges, it is always three times with a pause and then three times with a pause (like playing triplets). At this stage, I do not think that he did it intentionally, it is more like randomly. However, I decide to imitate his pattern to see if he recognises.	The child is neither looking at the piano nor me.	No signs or evidences show that the child is aware of his pattern being imitated.
		He tries to get up from the piano stool and wants to run away again.		
17 seconds	R.3.A.1	To draw his attention back to the piano, I play a series of repeated chords (C major) with a regular beat.	The child looks at the piano and starts to join in with me. He is playing the same beat as me although not the same keys.	It seems that the child enjoys the rhythmical task or that regular beats appeal to him. It has become clear to me that the child is able to follow a regular beat.
25 seconds	R.5.A.1	I continue to play the chords with a regular beat.	The child starts to press on the pedal this time and the movement matches the pulse of my playing.	
		Perhaps the child starts to feel tired, he stands up from the chair and runs off again.		

12 seconds	P.3.A.2	I hold the child's hand to play repeated note C.	The child tolerates the input and looks at the piano.	
		When I let go of the child's hand, he starts to play with the controller of the digital piano and then runs off again. I decide to end the session as the child cannot concentrate anymore.		
12 5 seconds	P.3.A.2	I hold the child's hand to create repeated note C that they did from the last session.	The child only tolerates the input for 2 seconds and starts to pull his hand away and bangs the piano.	It seems that the child is coping with the transition of task (from classroom to piano session). He needs more time to settle down.
6 seconds	I.3.B.1	Since the child is unable to tolerate the input, I decide to change strategy by playing the repeated notes and pauses for the child to imitate.	The child imitates the pattern accurately.	I am certain that the child's imitation skill is improved and that he is able to imitate accurately without prompts or support.
12 seconds	R.3.A.1	I then play regular beats of C major chord from the previous session.	The child moves with the beat at first and then starts to move around randomly and started screaming. The child is feeling unsettled. After 5 seconds, the child seems to calm down and he looks at the piano and starts to	The child is still trying to settle down. Perhaps more time is needed for him to calm down and focus on the task.

			play repeated notes with regular beat with me.	
11 seconds	I.3.C.1	When the child stops, I deliberately copy his pattern (repeated note) to see if the child is aware of his pattern being imitated.	No evidences show that the child is aware of his sounds is being imitated. He starts to bang on the piano and pushes the piano and then wanders off.	
13 seconds	I.3.B.1	I try to calm him down and encourages him to engage on the task by calling his name and uses simple instruction words like 'look'. I play a single note C.	The child looks at the piano and starts to imitate the same note. This then turns into a call and response activity.	It seems that the child is able to engage on task when he is more settled down/calm down.
		The child then suddenly stops and starts to scream again.		
11 seconds	R.3.A.1	I manage to calm the child down. I then start to play repeated chords again with a regular beat in hope to stimulate the child.	The child looks at the piano and then starts making some noises and then bangs the piano.	The child seems distracted and feeling very unsettled today. He is constantly looking around the room as well instead of engaging on the task.

12 seconds	R.3.A.1	I then decide to glide the keys up and down the piano as I remember the child likes the sounds of glissando.	The child engages through looking attentively. When I stop, he starts to vocalise.	It is unknown what is the meaning behind the vocalisation. I assume that the child wants me to play again.
7 seconds	R.3.A.1	I glide the keys again.	The child looks at the piano and when I stop, he starts to play with his tongue.	The child is very distracted today.
21 seconds	P.3.A.2	I decide to change strategy and hold his hand to create patterns on the piano — ascending pattern of notes C, D, E, F, G.	The child tolerates the input but halfway through the task, he starts to play with my hair.	
20 seconds	P.3.A.2	I try again.	The child only tolerates the input for four seconds and then starts to play with his tongue again and lies on the piano.	
		The child is now lying on the piano and reluctant to get up.		
11 seconds	R.3.A.1	Since I am unsuccessful in getting him to sit up, I decide to play repeated chords to stimulate him as his ear is	The child is looking at me, but no evidences show if he is attending to the sound.	The child is encountering sound but it is unclear if he is attending to it.

		leaning on the piano.		
		The child is still reluctant to sit up and engage on any task.		
9 seconds	R.3.A.1	I continue to play the repeated chords again.	After five seconds, the child finally sits up and watches. When I stop, the child starts to play repeated notes on the piano.	The child is not in his best concentration today.
7 seconds	I.3.C.1	I deliberately imitate the child to see if the child is aware of his own sound being imitated.	The child is neither looking at the piano nor me. He starts to move around.	
6 seconds	I.3.B.1	I change strategy and starts to play the rhythmic motif imitation activity with the child.	The child imitates the motif and engages in turn taking with me.	It seems that the child is drawn towards the rhythmical task and he remembers the activity.
14 seconds	I.3.B.1	When the child stops engaging, I encourage him using the 'more' hand sign.	The child starts to imitate the rhythmic motif through clapping.	Creativity seems to unleash here where the child is able to transfer the rhythmic motif into clapping it instead of playing on the piano.

10 seconds	I.3.B.1	I encourage the child to continue when he stops.	The child ignores me.	It seems that the child is distracted again.
4 seconds	P.3.A.2	I decide to hold the child's hand to play the rhythmic motif.	The child cannot tolerate the input and wanders off.	
16 seconds	R.3.A.1	I then demonstrate making a simple pattern on the piano — repeated note C.	The child is neither looking at me nor the piano. He is looking around the room.	
5 seconds	P.3.A.2	I hold the child's hand to play on the repeated notes.	The child tolerates the input for about three seconds and then pulls his hand away.	The child has very short concentration span today.
20 seconds	P.3.A.2	I try again by holding his hand but this time to play descending pattern of notes.	The child tolerates the input, but he is not looking at the piano.	
12 seconds	P.3.A.2	I try to hold his hand to play again.	The child is reluctant to be held by me	It seems that the child is having behavioural issues today. He is not

			and runs away.	able to concentrate and constantly wants to run away.
13 seconds	I.3.B.1	I change strategy and play repeated note C and pause for the child to copy.	The child imitates accurately.	The child seems to like imitation activities. However, when I repeat the task, the child runs away.
5 seconds	P.3.A.2	I then hold the child's hand to play repeated notes.	He tolerates the input for two seconds and then pushes my hand away.	As the child seem to be very distracted today and keeps running off, I decide to stop the lesson today.

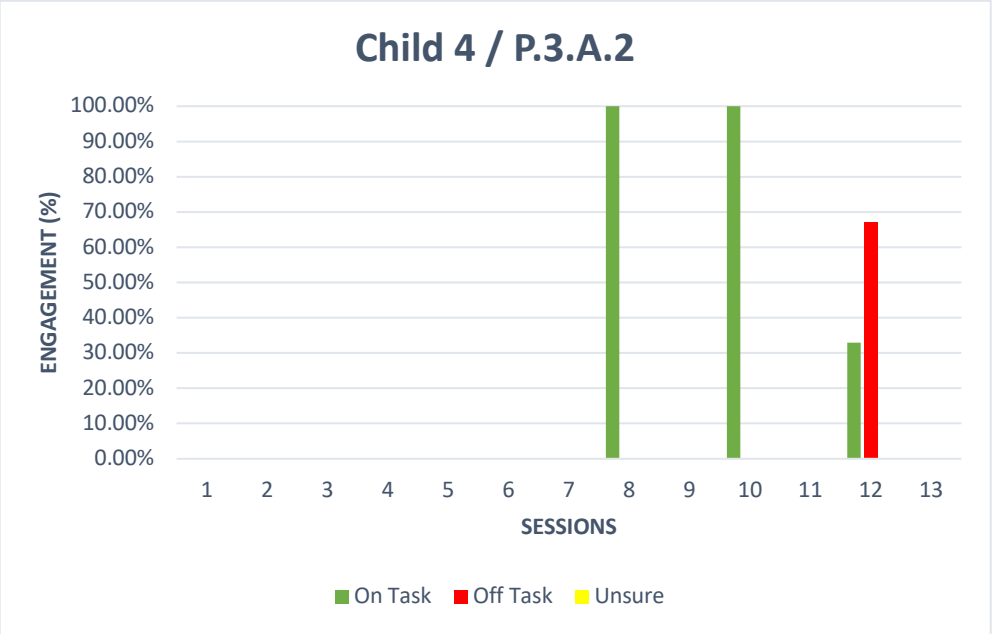


Figure 62. Engagement of Child 4 on Strategy P.3.A.2

Appendix 11 – Child 5

Child 5

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
			When the child arrives at the music room, he starts to press the controllers (sound buttons) of the digital piano and bangs on the piano.	It seems that the child is exploring the piano as it is a new instrument to him.
1 35 seconds	P.3.A.2	As the child seems to be keen in exploring the piano. I decide to hold the child's hand to create simple patterns on the piano — repeated note C.	The child only tolerates the input for three seconds and then he pulls his hands away and starts banging on the piano randomly.	It is a very new task and environment for the child and therefore I acknowledge that perhaps the child needs more time to be familiarised with the task and me. He also needs time to settle down.
13 seconds	R.3.A.1	I demonstrate making simple patterns on the piano, cluster of note on high and low sounds for the child to listen as he was banging on the piano.	The child does not engage. He is moving around and looking around the room although he does look at the piano once.	It is uncertain whether the child looks at the piano is because he is drawn to the sound or he is just looking around. At this point, the child is still unsettled and is moving around a lot.
17 seconds	P.3.A.2	I try to hold his hand to play on the piano.	The child immediately pulls the hand away and starts banging on the piano.	Perhaps the child is exploring the piano, or he thinks that is the way of

				producing sound on the piano. The child is still reluctant to let me to hold his hand. This may due to he dislikes the sensation of touch.
7 seconds	I.3.B.1	As the child does not like me to hold his hand, I change strategy by playing a simple pattern (repeated note C) and pause for the child to imitate. I use hand sign and simple instruction 'copy' so that the child understands what to do.	The child looks at the piano and manages to imitate the pattern but then he starts to bang on the piano again.	At this stage, I think that the child likes the texture coming from banging the piano or that he likes the sound of banging on the piano.
18 seconds	I.3.C.1	I then imitate his banging to see if he recognises that his sound is being imitated.	The child is neither looking at the piano nor me. He is looking around when I am banging on the piano.	No evidence shows that the child is aware of his own sound is being imitated.
17 seconds	P.3.A.2	I then try to hold his hand again to play repeated notes.	This time, the child tolerates the input however he is neither looking at the piano nor me when I support his hand to play the piano. After 5 seconds, he pulls his hand away and starts to bang on the piano again.	Although there is some progress concerning letting me to hold his hand to create repeated notes on the piano, the child is not engaged on the task. He is not attending to the sound he is creating on the piano and is distracted by the surrounding (looking around).

21 seconds	R.3.A.1	I then demonstrate playing the repeated notes again.	The child is looking around, turning his head facing the window and moving around. He is not focusing on the piano nor the sound I made.	The child is encountering the sound but not attending to it.
		The child starts to bang on the piano and starts playing on the sound buttons on the piano and the metronome display. He is fascinated by the numbers displayed on the screen and starts to press on the controllers to look at the different metronome speed (numbers) displayed on the screen and read them out loud.		
14 seconds	R.3.A.1	While I am not able to stop him from doing that, I decide to play the repeated notes again on the piano in hope to draw his attention back to the session.	The child is neither looking at me nor the piano. He is still pressing on the controllers.	The child is distracted by the controllers (sound buttons) on the piano and obsessed in playing on them. The child is encountering sound but not attending to it.
30 seconds	R.3.A.1	I continue to play but while playing, I call out his name and say look.	The child is still playing with the sound buttons but halfway through he starts pressing random keys on the piano and then bangs the piano.	
26 seconds	I.3.B.1	Since the child starts making sounds on the piano. I play a single note C and pause for the child to imitate. I use	The child watches but unable to imitate the note I played. He starts to play random notes on the piano.	Imitation is unsuccessful. Here, it shows that when the child is distracted by the external factor, it can affect his

		short instruction ‘copy’. I demonstrate again, and this time cue him to play the note by pointing on the key.	He presses other keys and then starts to press on the sound buttons again.	engagement on task.
18 seconds	R.3.A.1	I decide to continue to play different patterns on the piano at this stage to provide a vast listening experience for the child since the child is not able to engage on the task in creating simple patterns. I play descending pattern of note.	The child is playing on the sound buttons. When I call his name, he starts to bang on the piano.	The child is encountering sounds but not attending to it. The fact that he starts banging on the piano when he hears his name being called, it may be because he thinks I am asking him to play.
22 seconds	P.3.A.2	When I see him banging on the piano, I take the opportunity to hold his hand again to press down the keys.	The child refuses and pulls his hand away.	The child is still reluctant to be supported by me in creating simple patterns on the piano.
4 seconds	P.3.A.2	I try again and hold his right hand to play repeated notes.	The child tolerates the input, but he is not engaged on the task as he is still playing with the sound buttons with his left hand.	The child is distracted by the external stimuli (sound buttons).
20 seconds	R.3.A.1	I then continue to demonstrate playing	The child is neither looking at me nor	

		on the piano with different patterns. Ascending patterns of notes and descending pattern of notes.	the piano. He is playing with the sound buttons.	
		As the child is not able to engage on the task as he is now obsessed with the sound buttons and the metronome screen display with numbers, I decide to end the session. Now that I know the child likes numbers, she decides to put number labels on the keys to engage him in playing the piano and showing him patterns can be created on the piano.		
5 16 seconds	R.3.A.1	I have been told by the teaching assistant that the child likes nursery songs that he has been listening to in the class. I decide to engage him in playing simple nursery song (Twinkle) that is formed through simple patterns.	The child looks at the piano occasionally although not consistently throughout. He then claps his hand when I complete the song.	It seems that the nursery song is appealing to the child and is able to engage him to stay on task for a short period (5 seconds). The fact that he claps his hand when I complete the song shows that he recognises the song.
18 seconds	P.3.A.1 P.3.A.2	I use number labels on the keys to help the child to recognise simple patterns. I play the key and name the numbers while playing them. I then hold the child's hand to play the keys.	The child is neither looking at the number nor me. He only tolerates the input for three seconds. He then pulls his hand away and starts to press random keys on the piano.	Perhaps the child is still trying to settle down from the transition of task (from classroom to piano session).
30 seconds	P.3.A.1	I try again by showing the numbers and names the numbers while playing	The child pulls his hand away and turns to look at me and starts to talk randomly	

	P.3.A.2	them. I hold the child's hand to play on the keys.	to interrupt me. He then pushes me away.	
14 seconds	R.3.A.1	I decide to demonstrate ascending pattern of notes and plays the keys again by naming the numbers.	The child engages by looking at the piano keys.	The child is finally engaging and attending to the pattern I created.
13 seconds	R.3.A.1	I try again and play ascending pattern of notes.	The child engages through looking and claps his hand showing excitement.	
32 seconds	R.3.A.1	I play the ascending pattern of notes again.	The child looks at the piano and claps his hands. However, halfway through the demonstration, he suddenly stands up and wants to wander off. He is instructed by the teaching assistant who is sitting at the corner of the room to sit down. When he sat down, he tries to push my hand away from the piano to prevent me from playing but it is unsuccessful. He then stops and looks at my hand playing on the piano. It seems like he starts to listen. When I stop, he claps his hand hands and says 'Yeah!'.	Perhaps the task is slightly too long, and that the child loses concentration halfway. He wants to prevent me from continuing however when this fails, he starts to look at the piano and seems to listen to the patterns I played. I notice that for child 5, determination to continue is important as the child has very short attention span and behavioural issue according to the class teacher and the teaching assistant. He likes to wander off or tries to disrupt the task if he does not feel like participating.

9 seconds	R.3.A.1	I then change the pattern by playing on a different register (high and low) to introduce different sounds on the piano can be achieved.	The child seems to engage on the task and looks at the piano while I am playing.	The child is attending to the sound I made.
29 seconds	R.3.A.1	I continue to play ascending pattern of notes on different registers.	The child looks at the piano, seems like he is listening to what I am playing. He then attempts to play on the sound buttons that I covered up before the session begins. When he fails to play on the sound buttons, he starts to focus on the task again listening and looking at my playing.	Here shows that when external distraction is eliminated, the child is able to stay on task and listens attentively.
		The child then wanders off. Perhaps it has been too long on the task and that the child loses concentration and wants to run around.		
13 seconds	P.3.A.1 P.3.A.2	When the child settles down, I hold his hand to play on the keys with the number labels.	The child tolerates input and he is looking at the keys that he is playing.	It is the first time that the child tolerates me to hold his hand to play on the keys. Perhaps the child is now familiarised with me and therefore he allows me to hold his hand to play.

12 seconds	I.3.B.1	I then play repeated note C and pauses for the child to imitate.	The child attempts to imitate although not as accurate.	It seems that the child has not quite understood the concept of imitation. This may due to deficit in joint attention thus leading to the child performs poorly on imitation task. However, approximate imitation takes place here where the child attempts to imitate (a gesture of imitation during the first attempt) although inaccurate notes. It is through many repetitions to develop the skill.
12 seconds	P.3.A.2	I hold the child's hand to play ascending pattern of notes.	The child tolerates the input but when I let go of his hand, the child starts to bang on the piano.	The child has yet to be able to create simple patterns independently.
8 seconds	R.3.A.1	I introduce a descending pattern of notes this time.	The child engages by looking at the piano.	The child is attending to the sound.
13 seconds	P.3.A.1	I point at the number labels and name the numbers to introduce pattern.	The child pushes me away.	It seems that the child is reluctant to engage on the task. He has yet to recognise patterns on the piano.
8 seconds	R.3.A.1	I then play ascending pattern of notes	The child looks at the piano.	Perhaps the child is drawn to the sound made by the piano. He is attending to

		and names the number as well.		the sound.
18 seconds	R.3.A.1	I play the pattern again.	The child yawns and starts to press random keys on the piano while I am playing. When I stop him, he then looks at my demonstration.	It seems that the child starts to feel tired and his concentration is reduced.
4 seconds	P.3.A.2	I then hold the child to play repeated notes.	The child tolerates the input but only for four seconds and then he pulls his hand away.	The child has a short concentration span at the moment.
14 seconds	R.3.A.1	I decide to play ascending and descending pattern of notes.	The child looks at the piano occasionally and then looks around. He then presses at random keys while I am playing.	The child seems to be unsettled and that he cannot concentrate on the task anymore.
7 seconds	R.3.A.1	I then play the patterns again.	The child looks at the piano and then looks away and when I stop, he claps hand showing excitement.	It is uncertain why the child claps his hand for excitement. Was it that he recognises the patterns? Or was he happy that I finally stop playing?

28 seconds	I.3.B.1 P.3.A.2	I then play ascending pattern of notes and pause for the child to imitate. I use simple instruction 'copy'. I provide scaffolding by holding the child's hand to copy the pattern.	The child looks at the piano and attempts to imitate but unsuccessfully. The child tolerates the input but only for about five seconds and then he pulls his hand away and starts banging on the piano.	The child has yet to develop an understanding of the concept of imitation however it is a good first attempt to try to imitate.
19 seconds	R.3.A.1	I then demonstrate the descending pattern of notes again on high sound.	The child wanders off looking anxious and when he approaches the piano, he hugs me.	It seems that the child is sensitive to high sound or perhaps he is feeling agitated after spending such a long time on the session.
13 seconds	P.3.A.1 P.3.A.2	Once the child has calmed down, I hold his hand to play repeated notes on the piano again.	He tolerates the input for two seconds and then pulls his hand away and starts to bang on the piano.	It is unknown why the child is feeling agitated at this point. Perhaps his concentration has worn off.
		The child is holding my hand to prevent me from playing.		
25 seconds	P.3.A.3	Since I am unable to hold the child's hand to play on the piano. I cue the child to play a specific note on the piano.	The child bangs the piano.	The child is not engaging on the task.

42 seconds	I.3.B.1	I then try imitation in the hope that the child may try to imitate my playing.	The child looks at the piano while I am playing however he starts to press random keys down. No imitation attempt is made. He then leans on me and moves around.	
50 seconds	R.3.A.1 P.3.A.3	I then play his favourite nursery songs to cue the child to play on the piano. Using the wheel on the bus go round and round, round and round, round and round, I deliberately stop at the end of the phrase and prompt the child to play the note C.	It is not always successful, most of the time the child bangs on the piano as opposed playing a note C however he engages when being cued to play.	The child recognises the song as he engages when I prompt although not accurately play.
		When the song finishes, the child stands up and wanders off. I end the session.		
6 17 seconds	R.3.A.1	I play an ascending pattern of notes for the child to listen.	The child starts pressing on the sound buttons again and while I cover the metronome display with a white paper, the child tears it up.	The child is encountering the sound but not attending to the sound. He is distracted by the sound buttons again.

6 seconds	R.3.A.1	As the child cannot be stopped, I try again and play ascending pattern of notes in hope to draw his attention back to the piano.	The child starts to name out loud the tempo marking (numbers) on the metronome display screen.	
52 seconds	R.3.A.1	I decide to sing the numbers of the keys while playing them.	The child occasionally looks at the piano but mainly distracted by the numbers on the metronome display screen.	The child is very distracted by the metronome display screen today. He occasionally engages by looking at the piano when I sing the number and plays on the piano. It is unknown if the child is attracted to the singing or the sound played on the piano.
54 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play the piano keys while singing the number at the same time.	The child tolerates the input for about five seconds and then he starts to pull his hand away. His attention is constantly on the metronome display.	With the external stimuli that distract the child, he cannot engage on the task.
22 seconds	P.3.A.1 P.3.A.2	I decide to hold the child's hand to play on the piano keys again.	The child tolerates the input. However he is concentrating on the metronome display. He is not looking at what he is playing on the piano at all.	At this stage, although the child tolerates the input, he is not engaged on task as he is not looking at what he is playing. He is obsessed with the metronome marking.

		I try to draw his attention back to the piano however it is not successful. I then use simple instruction such as ‘look’, ‘piano’, ‘play’.		
15 seconds	P.3.A.1 P.3.A.2	I start calling the child’s name and hold his hand to play the keys again.	The child finally looks at the piano and looks at what I am doing.	I successfully draw the child’s attention on the piano for a short time.
23 seconds	P.3.A.1	I play ascending pattern and sings the numbers.	The child looks at the piano while I am playing. He then starts to play repeated notes (number labelled 7 and 8).	This is the very first time where the child creates his pattern.
		When I ask him to do it again, the child starts to play on the sound buttons again and looking at the metronome display.		
20 seconds	P.3.A.2	I hold his hand to play ascending pattern of notes.	The child tolerates the input and when I let go of the child’s hand, the child completes the ascending pattern by playing the final note.	It seems that the child starts to recognise the pattern on the piano and that he is able to complete the pattern.
10 seconds	P.3.A.3	I play the ascending pattern of notes again but deliberately leave the last note and prompt the child to complete the pattern.	The child completes the pattern. And when I repeat the task, the child looks away from the piano.	The child has a short attention span.

16 seconds	P.3.A.3	I change the pattern and introduce descending pattern of notes and deliberately leave the last note and prompt the child to complete the pattern.	The child looks at the piano and starts to press random keys. When I prompt him to complete the pattern, he attempts to play but with an inaccurate note.	It is a good attempt although the note is inaccurately played.
		The child starts to play with the sound buttons again and does not want to engage on the musical task. When I call his name, he covers his ears and keeps pressing on the sound buttons.		
15 seconds	P.3.A.1 P.3.A.2 P.3.A.3	I hold the child's hand to play ascending pattern of notes again. I then prompt the child to complete the pattern.	The child tolerates the input and engages. He manages to complete the pattern by playing the final note.	The child starts to recognise the pattern now as he has completed the pattern twice.
33 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play the pattern again.	The child is looking at the metronome and playing on the sound buttons.	The child is distracted again.
14 seconds	P.3.A.3	I then play the patterns and prompts the child to complete the pattern.	The child is able to complete the pattern.	Here shows that the child starts to gain recognition that simple pattern can be created on the piano and he recognises the pattern by playing on the right note.

28 seconds	P.3.A.1 P.3.A.2	I decide to introduce different patterns that can be created on the piano. I play repeated notes.	The child tolerates the input. However he is not looking at the piano at all. His left hand is constantly pressing on the sounds button and he is focusing on that.	The child is very easily distracted by external stimuli.
1 minute	P.3.A.3	I play the ascending pattern of notes several times and prompts the child to complete.	The child is not always on the task. He completes the phrase twice and then other time he is playing on the sound buttons or move around the piano. He is also constantly looking around the room.	It seems that the child is feeling unsettled. He is not able to focus on the task although he completed the pattern twice. Most of the time he is playing on the sound buttons and looking around.
11 seconds	P.3.A.1 P.3.A.3	I try again and prompt the child to complete the ascending pattern of notes.	The child finally engages and completes the pattern.	It seems that the child is only able to focus on a very short period. His concentration is short.
14 seconds	R.3.A.1	I decide to introduce more patterns for the child. I play the descending pattern of notes.	The child is distracted by the sound buttons again and keeps pressing on them, exploring the buttons.	The child is distracted again. He is encountering sound but not attending to it.

1.31 minute	R.3.A.1	I decide to play nursery songs that the child listens typically to in the class.	The child is still playing on the sound buttons. He is neither looking at the piano nor me. He is very focused on pressing every sound button.	
42 seconds	R.3.A.1	I try to stop him and motivate him to engage on playing the piano however unsuccessful. I continue to play nursery songs for the child.	The child is playing on the sound buttons.	
9 seconds	P.3.A.1 P.3.A.2	I decide to hold the child's hand to play on the ascending pattern of the notes.	The child tolerates the input. However he is not attending to what he is playing. His left hand is still exploring the sound buttons and he is looking at the metronome display.	The child is still distracted by the buttons.
8 seconds	P.3.A.1 P.3.A.3	I then prompt the child to complete the ascending pattern of notes.	The child manages to complete the ascending pattern of notes and then looks away from the piano.	It seems like the child only engages when he is prompted to complete the pattern.
9 seconds	P.3.A.1 P.3.A.3	I prompt the child to complete the descending pattern of notes.	The child manages to complete the descending pattern of notes.	

30 seconds	R.3.A.1	I play the ascending pattern again and prompt the child to do it. I decide to play nursery songs for him.	He looks away from the piano. He occasionally looks on the piano and then presses on the sound buttons again.	The child is very distracted by the sound buttons on the piano today. He is encountering sound but not attending to it. Only occasionally look at the piano.
13 seconds	R.3.A.1	I change the pattern by playing glissando on the piano.	When I stop, the child pulls my hand towards the piano.	It seems like the glissando catches the attention of the child and the gesture shows that he wants to hear more.
46 seconds	R.3.A.1	I play glissando again. I play a few times in hope to attract the attention of the child.	The child looks away and presses on the sound buttons again. The child is neither looking at the piano nor me. He is very focused in playing on the buttons.	Once again, the child is distracted by the sound buttons. As the child is very distracted today, I decide to end the session.
9 8 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play ascending pattern of notes that he learnt from the previous lesson.	The child tolerates for six seconds and then starts banging on the piano.	Perhaps the child is dealing with transitioning of task (from classroom to piano session). He needs some time to settle down.
50 seconds	R.3.A.1	I decide to play some nursery songs while the child is trying to settle down.	The child starts to press on the sound buttons on the piano.	He is encountering the sound but not attending to it. He gets distracted by the sound buttons as well.

12 seconds	P.3.A.1 I.3.B.1	I play a single note C and pause for the child to imitate.	The child is neither looking at the piano nor me. He is playing on the metronome and sound buttons on the piano.	Once again, the child is distracted by the metronome and sound buttons on the piano.
9 seconds	P.3.A.1 P.3.A.3	I play ascending pattern of notes and prompts the child to play.	When prompted, the child completes the pattern.	Here, it shows that the child recognises the pattern that he learnt from the previous session. He is able to complete the pattern with the correct note.
7 seconds	P.3.A.1 P.3.A.3	I repeat the task.	The child once again able to completes the pattern.	
15 seconds	P.3.A.1 P.3.A.3	I repeat the task since the child is engaging.	The child turns away and starts pressing on the sound buttons again.	The child is distracted by the metronome display and sound buttons on the piano.
		I quickly grab a sticker label and covers the metronome display. The child then turns off the piano.		
23 seconds	R.3.A.1	I then play the ascending pattern of notes again several times.	The child tries to tear off the sticker.	He is encountering sound but not attending to it. He is distracted by external stimuli.

10 seconds	P.3.A.3	I then prompt the child to play the numbers I named.	When prompted, the child is able to play on the correct keys.	At this stage, it is uncertain if the child recognises the sound of each key or that he is playing simply matching the numbers I named. It is also uncertain if he engages on the task because he wants to play the piano or that he is fascinated by the numbers.
24 seconds	R.3.A.1	I play ascending pattern of notes again.	The child starts to press on random keys and then bangs on the piano. He tries to tear the sticker off from the metronome screen as well.	The child is distracted again.
3 seconds	R.3.A.1	I decide to play the pattern again.	While I start to play, the child holds on to my feeling anxious and prevents me from playing.	It is unknown why the child is behaving anxiously. Perhaps he is yet to settle down.
17 seconds	P.3.A.1 P.3.A.3	I play an ascending pattern of notes again and prompt the child to complete the pattern.	The child is pressing at the sound buttons again.	The child is distracted again.

10 seconds	R.3.A.1	I decide to continue even the child is playing with the sound buttons. I play ascending pattern of notes again.	The child is neither looking at the piano nor me. He is pressing at the sound buttons.	The child is encountering the sound but not attending to it.
13 seconds	R.3.A.1	I continue to play.	The child is still trying to tear the sticker off the metronome display and he interrupts me by talking something randomly.	
10 seconds	I.3.B.1	I decide to change strategy. I play repeated note C and pause for the child to imitate. I use simple instruction 'copy'.	The child imitates the repeated notes accurately.	Here, the child is able to follow simple instruction and carry out the task.
10 seconds	R.3.A.1	I demonstrate playing repeated notes again.	The child wanders off.	The child is very restless today as he is constantly moving around and now he decides to wander off.
21 seconds	R.3.A.1	I decide to continue to play on the piano (nursery songs) in hope to draw his attention back to the piano.	The child is walking around the room and when he approaches the piano, he interrupts me by pushing my hand away.	The child is still feeling unsettled.

30 seconds	R.3.A.1	I continue to play.	The child starts pressing random keys on the piano to interrupts me.	
5 seconds	R.3.A.1	I play a short pattern (ascending pattern of notes).	The child starts pressing on the button and then switch off the piano.	The child is encountering sound but not attending to it. It seems like the child has found his new interest – switching off the piano.
17 seconds	R.3.A.1	I try to play the short pattern again.	Again, the child is playing on the sound buttons and then switch off the piano.	
12 seconds	R.3.A.1	I play the pattern again.	The child is looking at the sound buttons but not at the piano keys where I am playing.	
26 seconds	R.3.A.1	I change materials and plays nursery songs.	The child interrupts me by pointing at some of the scores on the piano and starts talking randomly to me. He then presses on the button and then switches off the piano again.	

1.11 minute	P.3.A.3	I decide to focus on the task of completing the ascending pattern of notes. I repeat the task several times (8 times).	The child only able to complete three times out of eight. Most of the time he is playing with the sound buttons.	As the child is once again focused on the sound buttons and constantly switching off the piano, I end the session for today.
11 51 seconds	R.3.A.1	As the child comes in feeling unsettled, I decide to play nursery song to start with in hope to calm the child down with songs that he is familiar. I deliberately play incomplete phrase and pause for the child to respond.	The child starts banging on the piano while I am playing. When I stop, the child completes the phrase with singing.	The child is feeling distressed when he comes in for the lesson today. This may affect his performance during the session.
1.09 minute	R.3.A.1	As the child seems excited to hear the songs, I continue to play the songs several times.	The child shouts excitedly and smiles. He then starts banging on the piano.	The child recognises the songs, this is showed through his facial expression and that he shouts excitedly as well. However, he is yet to feel comfortable to engage the piano task.
53 seconds	R.3.A.1	I continue with the songs and then changes materials to playing ascending pattern of notes and descending pattern of notes.	The child starts to bang the piano and then looks somewhere else. He is not engaged on the task.	The child is encountering the sound but not attending to it. It is unclear at this point that his banging on the piano is to block the sound I played or that he is engaging the task his way.

12 seconds	P.3.A.3	I decide to change strategy so that the child participates in the piano task. I deliberately plays an ascending pattern of note and prompts the child to complete the pattern.	The child is not looking at the piano while I am playing. When I prompt the child, he then turns his head and plays on the key that I am pointing.	The child is still feeling slightly restless and agitated. However, when prompted, he is able to complete the pattern accurately.
37 seconds	P.3.A.3	I play the pattern again and prompts the child to complete the pattern.	The child starts banging on the piano.	The child is not engaging on the task.
28 seconds	R.3.A.1	I then decide to play the ascending and descending patterns for him to listen.	He starts to look at the scores that are on the piano and starts playing with them.	The child is distracted by external stimuli.
40 seconds	P.3.A.3	I continue to play ascending pattern of notes and prompts the child to complete the pattern.	This time, the child is able to focus on the task and completes all the pattern accurately when I prompted.	It seems that the child is finally settled down and engages on the task.
31 seconds	P.3.A.1	I then show the child of the keys that is labelled with numbers. This is to reinforce in learning and to recognise	The child starts to shout and looks away.	So far, I notice that the visual labels are not so useful in helping the child to recognise the patterns on the piano.

		the pattern.		The child is not reading the labels.
21 seconds	P.3.A.1 P.3.A.3	I then combine the strategy with P.3.A.3 and prompts the child to play the keys by singing the numbers.	The child plays the keys accurately.	Here, I find it useful that the visual labels are there to help the child to play the correct keys as the child is yet to recognise the keys without the labels.
43 seconds	R.3.A.1	I then demonstrate playing different patterns on the piano.	The child wanders off.	The child is encountering the sound but not attending to it.
16 seconds	R.3.A.1	While the child is wandering around the room, since I am not able to get him back to the piano, I decide to continue to play the patterns for the child to listen.	The child is wandering around the room.	
1.02 minute	R.3.A.1	I manage to get the child to sit at the piano. I play nursery songs in hope to motivate the child.	The child looks at the piano occasionally but then starts to lean on the piano to sleep.	The child is encountering the sound but not attending to it. It seems like the child is not in the mood for piano session today.

17 seconds	P.3.A.1 P.3.A.2	I decide to hold his hand to play the ascending pattern of notes.	The child tolerates the input however when I let go of his hand, he starts to play random keys.	The child is unable to concentrate on task today due to behavioural issues.
13 seconds	I.3.B.1	I then play a note and pause for the child to copy.	The child is neither looking at the piano nor me.	
5 seconds	P.3.A.1 P.3.A.3	I play the pattern and prompt the child to complete the patterns.	The child completes the pattern when prompted.	It seems that the child will only engage when prompted.
14 seconds	P.3.A.1 P.3.A.3	I try again.	The child starts moving around and bends down to look at the bottom of the piano.	The child loses concentration again.
19 seconds	P.3.A.1 P.3.A.3	I try again.	The child completes the pattern when prompted.	The child only engages when he feels like to.
14 seconds	P.3.A.1 P.3.A.3	I try again.	The child completes the pattern when prompted.	

17 seconds	P.3.A.2	I then hold the child's hand to play the full pattern.	He tolerates the input but then pulls his hand away and runs off.	I end the session.

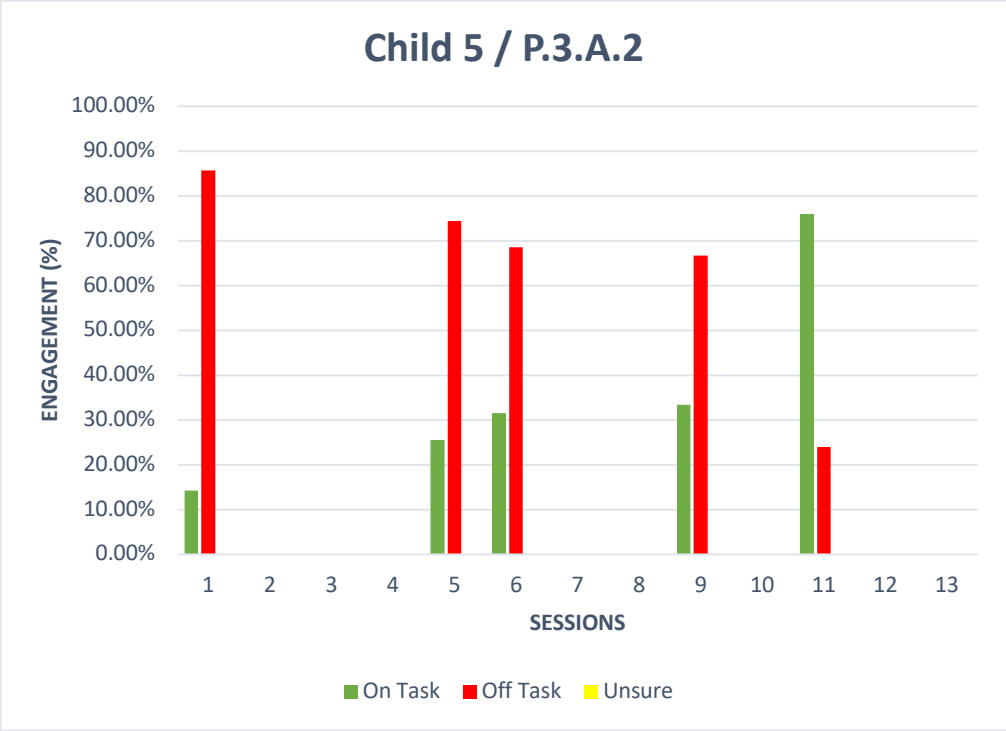


Figure 63. Engagement of Child 5 on Strategy P.3.A.2

Appendix 12 – Child 6

Child 6

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 28 seconds	P.3.A.1 I.3.B.1	I start the session by playing repeated notes.	The child copies my playing.	Visual labels are used for the child to match the pitches they learn on the piano. This is to provide additional support for the child. However, this strategy only works on children who have basic comprehension.
36 seconds	P.3.A.1 P.3.A.3	I play the repeated notes again but this time cue the child to play the correct notes.	First, the child does not respond to the cue however when I call his name and name the key; he starts to play the right note.	Joint attention is the notion here where research shows that deficit in joint attention is one of the core impairments of children with ASC which may lead to failure in responding prompts.
22 seconds	P.3.A.1 P.3.A.2 P.3.B.1	I hold the child's hand to play repeated notes.	The child tolerates the input but he is looking away from the piano.	Perhaps the child is still trying to make sense what is happening in the session.
35 seconds	P.3.A.1	I play the repeated notes again but	First, the child imitates but then	It is unsure if the imitation takes place

	I.3.B.1	this time pause for the child to imitate.	starts to press random keys.	randomly or the child is imitating my playing.
8 seconds	P.3.A.1 I.3.B.1	I play the repeated notes again and pauses for the child to imitate.	The child watches and imitates in return.	It is clear to me that the child is currently imitating my playing.
28 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play the repeated notes again to reinforce his learning.	The child tolerates the input and at the end of the event, he is able to play without support.	After support, the child is able to create a simple pattern without my help.
42 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play on the repeated notes again.	The child tolerates the input at first and then pulls his hand away. He then starts to play with me but on random keys.	It seems that the child is eager to create his patterns. Or he is unable to tolerate me holding his hand for long.
1.18 minutes	P.3.A.1 P.3.A.3	Since the child is unable to tolerate the input, I prompt (sing) the note for the child to play.	The child plays the note named by me but not always accurate. When he fails, I start pointing at the keys to help him. He is then able to play the right note.	Perhaps the child is yet to comprehend basics letters, therefore, he is unable to respond to the cue when I sing.
24 seconds	R.3.A.1	I play repeated notes for the child	The child looks but then turns away	According to the teaching assistant, the child has a very short attention span.

		to listen.	from the piano.	Here, it may seem that the child is not attending to sound but perhaps he is internalising the sound unconventionally.
55 seconds	P.3.A.1 P.3.A.3	I then use the song If You Happy and You Know It to prompt the child to learn the notes.	The child plays the actual note when prompted. He is also singing the tune at the same time.	It seems that using song to motivate the child is a good strategy.
14 seconds	P.3.A.1 P.3.A.2	I support the child to play another pattern – ascending pattern of notes.	The child tolerates the input and watches.	At the end of the event, the child plays an ascending pattern of notes without my support. Here, it shows that scaffolding is essential at the early stages of learning.
12 seconds	P.3.B.1	I support the child to play the ascending pattern of notes with a regular beat.	The child maintains the regular beat.	The child can reproduce a regular pulse when supported.
32 seconds	P.3.A.1 P.3.A.2	I support the child to play ascending pattern of notes again.	The child tolerates the input although not consistently throughout.	

51 seconds	P.3.A.1 P.3.A.3	I then use the song If You Happy and You Know It to prompt the child to play a note.	The child sings the tune and plays the right note when it is his turn to play. However, his attention fluctuates throughout the event.	The child has yet to be able to focus on the task and sometimes he will lose his concentration and fail to respond to the cue.
11 seconds	P.3.A.3	Again, I prompt him to play the note.	The child does not respond.	The child's attention is falling.
10 seconds	R.3.A.1	I then play the repeated notes again.	First, the child is not looking at the piano and then he slowly turns his head and looks at what I am playing.	Perhaps there is a delay in processing? Alternatively, that the child is distracted.
5 seconds	P.3.A.2	I hold his hand to play the note.	He only tolerates for 2 seconds and then pulls his hand away. He then starts to play on random keys.	Perhaps the child does not like the sensation of touch. This can be explained as tactile defensiveness.
2 seconds	I.3.C.1	I decide to imitate his playing and observe.	The child has no recognition of own sounds being imitated. He is not looking at the piano while I am playing.	The child has yet to develop the awareness of own sounds being imitated.

6 seconds	R.3.A.1	I play the repeated notes again.	The child looks away from the piano.	The child is encountering sound but not attending to it.
12 seconds	P.3.A.3	I prompt the child to play a note by pointing at the keys.	The child responds and plays the right note however when I do it again; he starts playing random keys on the piano.	Perhaps the child is still exploring the instrument.
7 seconds	R.3.A.1	I play the repeated notes again.	The child starts playing random keys on the piano to disrupt me.	It seems that the child is feeling slightly unsettled. He is encountering sound but not attending to it.
10 seconds	P.3.A.1 P.3.A.3	I cue the child to play the note.	The child looks away.	The child starts to lose concentration on the task and does not want to engage.
2 seconds	P.3.A.2	I hold the child's hand to play.	The child tolerates the input but he is not looking at the piano.	Perhaps the child has yet to make sense what is happening when I hold his hand to play the note.
8 seconds	P.3.A.1 P.3.A.3	I cue the child to play the note again.	The child starts playing on random keys with all his fingers.	The child disengages from the task.

24 seconds	P.3.A.1 P.3.A.3	I then prompt the child again.	The child plays the note finally when I prompt.	The evidence suggests that the child has a short attention span and therefore cannot stay on task consistently. However, when he is paying attention, he is able to complete the task given.
31 seconds	P.3.A.1 P.3.A.3	I prompt the child again.	The child plays the right note.	
10 seconds	P.3.A.1 P.3.A.3	I prompt the child again.	The child watches but he does not respond.	
13 seconds	P.3.A.2	I hold his hand to play the note.	The child tolerates the input and watches.	
11 seconds	P.3.C.2	I cue the child to play the same note up and down the octave.	The child completes the task and can play same note up and down the octave without support at the end.	The child learns that a simple pattern can be regularly changed.
13 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play repeated notes again.	The child tolerates the input and watches.	

24 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play repeated notes again.	The child tolerates the input and at the end of the event, he can play without my support.	
3 17 seconds	P.3.A.1 P.3.A.3	I play repeated notes and prompt the child to play.	The child plays the right note.	The child is responding to my cue.
29 seconds	P.3.A.1 P.3.A.2 P.3.B.1	I hold the child's hand to play repeated notes with a regular beat.	At first the child is reluctant to tolerate the input but eventually gives in.	Perhaps the child is afraid of the sensation of touch.
19 seconds	R.3.A.1	I play the repeated notes for the child to listen.	The child watches.	The child is attending to sound.
19 seconds			The child starts to play repeated notes without support.	It seems like the child is imitating what I am doing.
55 seconds	R.3.A.1	I play the pattern again.	The child watches.	The child is attending to sound.

40 seconds	R.3.A.1	I play the pattern again.	The child watches.	The child is attending to sound.
26 seconds	P.3.A.1 P.3.A.2 P.3.C.1	I hold the child's hand to play same note up and down the octave.	The child tolerates the input and is able to play without support after.	The child has now grasped the concept of a simple pattern can be changed.
4 seconds	R.3.A.1	I demonstrate playing same note up and down the octave again.	The child watches.	The child is attending to sound.
16 seconds	P.3.A.1 P.3.A.3	I prompt the child to play a note C.	The child plays accurately when I prompt and is able to play without support after.	The child can create a simple pattern without support.
13 seconds	R.3.A.1	I play If You Happy and You Know It again for the child.	The child sings and moves his body with the music.	This is the first time the child moves his body with the music. This can be explained through early movement and music.
23 seconds	P.3.A.1	Using the song again, I prompt	The child plays the right note when	The child sometimes fails to respond the prompt this may occur because of

	P.3.A.3	the child to play a note.	prompted however not consistently.	the deficit in joint attention.
8 seconds	P.3.A.1 P.3.A.3	I prompt the child to play a note again.	The child responds to the prompt accurately.	It seems that a shorter task may be more manageable for the child to complete.
8 seconds	P.3.A.1 P.3.C.2	I cue the child to play same note up and down the octave.	The child completes the task and can play by himself after without support.	The child can create a simple pattern with regular change without support.
4 seconds	P.3.A.1 P.3.A.3	I cue the child to play another same note up and down the octave.	The child watches and completes the task.	
13 seconds	P.3.A.1 P.3.C.2	I cue the child to play same note up and down the octave.	The child completes the task and can play by himself after without support.	
2 seconds	P.3.A.1 P.3.A.2	I hold the child to play repeated notes.	The child tolerates the input.	I use She'll be Coming Round the Mountain to motivate the child to play repeated note G.

19 seconds	P.3.A.1 P.3.A.2	I hold the child to play repeated notes.	The child tolerates the input and sings along at the same time.	The task is repeated several times to enhance the child's learning.
23 seconds	P.3.A.1 P.3.A.2	I sing along and hold his hand to play the repeated notes again.	The child tolerates the input.	
21 seconds	P.3.A.1 P.3.A.3	I cue the child to play repeated notes.	The child plays repeated notes and chants the lyrics at the same time.	The child is enjoying the task and it seems that using the song that the child is familiar with can motivate him to engage on task.
15 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play repeated notes again.	The child tolerates the input but not consistently throughout.	It seems that the child is trying to resist me to support him.
12 seconds	P.3.A.1 P.3.A.3	I then prompt the child to play since he is reluctant to be held.	The child plays the right note when prompted.	This is an excellent alternative strategy for children who are reluctant to be supported physically to play.
			The child starts to feel a little distress and starts to play random keys on the piano.	

9 seconds	P.3.A.1 P.3.A.2 P.3.B.1	I hold the child's hand to play repeated notes forming a regular beat.	The child tolerates the input but not consistently throughout the event.	Perhaps the child's concentration is falling.
11 seconds	P.3.A.1 P.3.A.2	I hold the child's hand to play repeated notes again but without a regular beat.	The child tolerates the input but not consistently throughout the event.	Perhaps the child is unable to tolerate the sensation of touch for an extended period.
46 seconds	R.3.A.1	I play a few songs for the child to draw his attention back to the piano.	The child watches and then starts to look around.	The child is encountering sound but not always attending to it.
11 seconds	P.3.A.2	I hold the child's hand to play repeated notes again.	The child tolerates the input but not consistently throughout the event.	As mentioned above, the child dislikes the sensation of touch perhaps.
12 seconds	P.3.A.3	I then cue the child to play the repeated notes.	The child starts to press random keys on the piano and starts singing Coming Round the Mountain.	It appears that the child does not seem to understand the cue.

12 seconds	P.3.A.2	I decide to hold his hand to play.	The child tolerates the input.	
30 seconds	R.3.A.1	I play the song again (She'll be Coming Round the Mountain).	The child looks around at first and then starts to sing when I play the second time.	It seems like the child's attention is dropping.
24 seconds	P.3.A.2	I hold the child's hand to play repeated note C.	The child tolerates the input this time.	
11 seconds	P.3.A.3	I then prompt the child to play the note again.	The child starts to play a random note. He does not respond to the cue.	As explained before, deficits in joint attention.
30 seconds	R.3.A.1	I start to play the song again.	The child sings and then starts pressing random keys to disrupt the lesson.	The child is not attending to the song.
18 seconds	P.3.A.3 P.3.C.2	I use cues to prompt the child to play same note up and down the octaves.	The child responds to the cue.	It seems that the child is more comfortable in doing what he has known.

16 seconds	P.3.A.3 P.3.C.2	I repeat the task.	The child watches but does not respond always.	I repeat the task a few times to reinforce his learning.
22 seconds	P.3.A.3 P.3.C.2	I repeat the task.	At the end of the event, the child is able to play same note up and down the octave without support.	
41 seconds	P.3.A.3	I cue the child to do it again.	The child starts banging the piano.	It seems that the child starts to feel frustrated and distressed.
26 seconds	R.3.A.1	I try to play some nursery songs for the child to listen.	He starts banging on the piano to block my playing.	
24 seconds	R.3.A.1	I do it again.	This time the child watches.	The child is attending to sound.
11 seconds	P.3.A.3	I wrap up the lesson by prompting the child to play the same note up and down the octave again.	He completes the task.	

4 36 seconds	P.3.A.1 P.3.A.3 P.3.B.1	I cue the child to play the repeated notes. I hold the child's hand to play the repeated notes forming a regular beat.	The child fails to respond to the cue. The child tolerates the input and observes.	Perhaps the child is coping with transitioning, therefore, fails to respond to the cue.
20 seconds	P.3.A.1 P.3.A.2 P.3.C.1	I hold the child's hand to play same note up and down the octave again.	At first, the child cannot tolerate the input but when I try again, he can tolerate.	It takes some time for the child to settle down in the lesson.
6 seconds	I.3.B.1	I play a note and pause for the child to imitate.	The child watches and imitates in return.	It appears that the child starts to grasp the concept of imitation.
35 seconds	I.3.B.1	I repeat the task several times.	The child can imitate accurately in return.	
6 seconds	P.3.A.1 I.3.B.1	I repeat the task.	The child looks away and refuses to imitate.	It appears that the child's concentration starts to drop.

17 seconds	P.3.A.1 P.3.A.2 P.3.C.1	I hold the child's hand to play an interval of third up and down the octave.	The child first tolerates but starts to pull his hand away and bangs on the piano.	The material may be new to the child to learn. Perhaps he does not like to be held.
10 seconds	P.3.A.3	I cue the child to play the pattern again.	The child starts banging on the piano.	It seems like the child is in distress.
16 seconds	P.3.A.1 P.3.A.2 P.3.C.1	I hold the child's hand to play same note up and down the octave.	The child tolerates the input and is able to perform the task by himself without support after.	Perhaps the child needs time to settle in the session.
1.55 minutes	R.3.A.1	I play the tune that the child has been listening previously – If you Happy and You Know It.	The child looks at the piano and sings along. He is smiling at the same time.	The child is attending to the song. It appears that he likes the song and is motivated by it.
24 seconds	P.3.A.3	I then prompt the child to play a note using the song.	First, the child does not respond. When I repeat, he responds.	Perhaps delay in processing or because of the deficit in joint attention.
25 seconds	P.3.A.3	I prompt the child again.	The child plays the correct notes but misnames the note.	It seems that the child is not associating the letters to the pitch that he is

				learning.
32 seconds	P.3.A.2	I hold the child's hand to repeat the task to reinforce his learning.	The child tolerates the input only for 4 seconds. He then pulls his hand away.	The child is unable to tolerate the input for an extended period.
12 seconds	P.3.A.2	I try again.	The child pulls his hand away and reluctant to be held.	The child dislikes being held, perhaps due to hypersensitive to the sensation of touch.
45 seconds	R.3.A.1	I play another song – She'll be Coming Round the Mountain.	The child looks at the piano occasionally and then starts pressing keys with the fingers and sings.	It seems that the child enjoys the song but his playing on the keys may occur because he wants to block my sound out.
3 seconds	P.3.A.2	I hold the child's hand to play repeated notes.	The child tolerates the input.	The child is able to tolerate the input for a concise time.
15 seconds	R.3.A.1	I then play the repeated notes for the child.	The child starts to bang the piano and moves around.	The child is feeling distressed. It is unknown what triggers him to behave in that way.

1.16 minutes	R.3.A.1	I try again to play.	The child starts to scream and cry.	
31 seconds	R.3.A.1	After trying to calm him down, I try again.	The child bangs the piano and blocks my playing.	
23 seconds	P.3.A.2	I hold the child's hand to play ascending pattern of notes.	He tolerates the input for 2 seconds and then pulls his hand away. I then try again; he is able to tolerate for another 5 seconds.	
12 seconds	P.3.A.2	I repeat the task.	The child is only able to tolerate for about 5 seconds and then pulls his hand away.	
48 seconds	R.3.A.1	I have no idea which song he is referring to and starts to play various songs in the hope that he will calm down.	The child starts to request a song that I have no clue. He says, 'Snow Song'. The child starts to bang the piano and feeling distressed.	The child requests a song out of the blue and I have no idea which song he is referring to. It is difficult to fulfil the child's request and when I fail to do so, the child starts to bang the piano showing sign of distress. I have to end the piano session.

5 44 seconds	I.3.B.1	I clap a rhythmic motif and pause for the child to imitate.	The child imitates in return.	It seems that the child has started to understand the concept of imitation.
1.12 minutes	P.3.A.2	I hold the child's hand to play descending pattern of notes.	The child tolerates the input.	This is the longest input that the child has tolerated. Perhaps he is feeling comfortable with me now and therefore allows me to hold his hand.
24 seconds	P.3.A.3	I prompt the child to play the descending pattern of notes.	The child responds to the prompt and plays the pattern accurately. However, when I repeat the task, he fails to respond to the prompt.	Deficit in joint attention.
1.13 minutes	R.3.A.1	I then play the songs that we have been playing in the session – If you Happy and You Know It and She'll be Coming Round the Mountain.	The child looks at the piano and sings along.	The child is attending to sound.
10 seconds	I.3.B.1	I play a note and pause for the child to imitate.	The child imitates in return.	

31 seconds	P.3.A.3 P.3.A.2	I prompt the child to play the descending pattern of notes again. When the child fails to respond to the prompt, I decide to hold his hand to play the pattern.	First, the child responds to the prompt when I repeat, he fails to respond to the prompt. The child tolerates the input.	One can see that I am alternating between strategies that suit the child in his learning.
			The child starts to request the Snow Song again and reluctant to engage. He starts to cry and scream, and we have to end the lesson.	
6 34 seconds	R.3.A.1	I start the session with the song If You Happy and You Know It.	The child watches and sings along but starts to bang the piano.	The child may be coping with the transition of the task.
42 seconds	P.3.A.2	I hold the child's hand to play the note.	First, he tolerates the input and then he pulls his hand away and starts playing random keys with all his fingers.	At this stage, I am quite certain that the child is able to create simple patterns on the piano. He cannot tolerate the input for an extended period.
24 seconds	P.3.B.1	I hold the child's hand to play repeated notes forming a regular	The child tolerates and plays with a	Here, the child seems to be able to play

		beat.	regular beat.	the repeated notes with a regular beat.
24 seconds	I.3.B.1	I then play the same note up and down the octave for the child to copy.	First, the child does not respond. When I call his name, he then plays same note up and down the octave.	The child's attention seems to be distracted or perhaps it is a delay in processing or deficit in joint attention.
15 seconds	I.3.B.1	I repeat the task.	The child imitates without my prompt.	The child understands the task that he needs to complete.
34 seconds	R.3.A.1	I play If You Happy and You Know it again.	The child sings along with me.	The child is attending to the song.
35 seconds	I.3.B.1	I then play same note up and down the octave again.	The child imitates in return.	I repeat the task several times to reinforce the child's learning.
16 seconds	P.3.A.3	I then change to play another note and cue the child to play.	The child responds to the prompt and plays the right note.	It seems that the child is engaging on the task so far and he is enjoying it.
12 seconds	P.3.A.2	I then hold his hand to play the note up and down the octave.	The child tolerates the input. The child is able to play the right note up	I am introducing a new note and support the child to learn the material.

			and down the octave without support after.	
57 seconds	P.3.A.3 P.3.C.2	I decide to repeat the task several times but using the cue to help the child if necessary.	The child stays on task most of the time. There are times when his attention sways and fails to respond to the cue.	Deficit in joint attention.
41 seconds	P.3.A.3 P.3.C.2 I.3.B.1	When the child fails to respond to the cue, I demonstrate to play the same note up and down the octaves again so that the child can copy.	The child watches and is able to imitate in return.	
2.10 minutes	P.3.A.3 P.3.C.2 I.3.B.1	I repeat the task several times.	The child is able to stay on task most of the time. There are times when he looks away from the piano and fails to respond to the cue or the imitation.	Deficit in joint attention.
30 seconds	P.3.A.2	I hold the child to create another pattern – ascending pattern of notes.	The child tolerates the input.	The child starts to be familiar with the session and the materials that he is learning.

9 seconds	R.3.A.1	I play If You Happy and You Know It again in a different key.	The child watches and sings along.	The child is attending to the sound.
3 seconds	P.3.A.3 P.3.C.2	I then prompt the child to play the note up and down the octaves.	The child is able to respond to the prompt and play the correct notes.	
10 seconds	P.3.A.2	I hold the child's hand to play ascending pattern of notes.	The child tolerates the input.	
6 seconds	P.3.A.2 P.3.C.1	I hold the child's hand to play same note up and down the octave.	The child tolerates the input and can perform to play the simple pattern without support after.	The child starts to master the task.
15 seconds	P.3.A.3	I cue the child to play same note up and down the octave.	The child responds to the cue.	
48 seconds	R.3.A.1	I start to play She'll be Coming Round the Mountain for the child.	First, the child sings along. He starts to feel distressed and bangs the piano.	It seems like the child is not very fond of the song.

11 seconds	I.3.B.1	I play a repeated G and pause for the child to imitate.	The child plays random keys on the piano.	The child is feeling distressed and is affecting his engagement.
2.21 minutes	R.3.A.1	The child is reluctant to engage in any playing. I decide to play different nursery songs for him.	The child looks at the piano occasionally and then looks away.	The child is attending to the songs but not consistently.
7 1.45 minutes	R.3.A.1	I start the session with She'll be Coming Round the Mountain.	The child listens and starts to sing.	The child is attending to the song.
1.13 minutes	I.3.B.1	I play same note up and down the octaves. (different note C, D, E.	The child imitates all of them although not consistently. There are times where the child fails to imitate.	Deficit in joint attention.
1.35 minutes	P.3.A.3	I prompt the child to play same note up and down the octave again when he fails to imitate.	The child responds to some of the prompt, not all.	
			The child starts to request for the song again – Snow Song and starts to cry and scream. The session is	

			unable to continue despite the fact that I try to play several songs to calm him down.	
10 40 seconds	R.3.A.1	I start the session with She'll be Coming Round the Mountain.	The child watches and sings.	The child is attending to sound.
5 seconds	P.3.A.2 P.3.B.1	I hold his hand to play repeated notes with a regular beat.	The child tolerated the input.	At this stage, I know that the child is not able to tolerate the input for long and therefore I shortened the task.
8 seconds	I.3.B.1	I play the repeated notes and pause for the child to imitate.	The child fails to imitate. He starts to move around and requests the song again.	It seems that it has become a routine that the child requests for the same song every time he comes for the piano session. I have asked teaching assistant and class teacher if they know anything about Snow Song, they say perhaps it is Frozen but they have no idea.
37 seconds	R.3.A.1	I play Frozen for the child.	First, the child looks at the piano and then he starts to yawn and look away.	It is uncertain at this stage if this is the right song or the child is feeling tired and distressed, therefore, he does not want to engage.

8 seconds	P.3.A.2	When I see the child has calmed down, I hold his hand to play repeated notes.	He tolerates the input and then pulls his hand away.	The child is getting distressed again.
			The child starts to scream and cry when I ask him to play the repeated notes.	
5 seconds	I.3.B.1	I then change strategy to imitation – same note up and down the octave.	The child imitates and then starts to request the Snow Song again.	
22 seconds	R.3.A.1	I play the song Frozen again.	The child looks at the piano and then looks away.	It is still uncertain if this is the right song.
8 seconds	I.3.B.1	I play same note up and down the octave again for the child to imitate.	The child imitates in return.	

41 seconds	P.3.A.3	As I see the child is willing to cooperate, I decide to prompt him to play other notes up and down the octave.	He responds to the prompt occasionally, not all the time. Most of the time he is moving around and wanting to cry.	
			The child starts to scream and cry and asks to return to the class. I have to end the session short again.	
12			The child comes in feeling distressed. It seems that the last few sessions, the child shows sign of distressed when it is time for the piano session. Perhaps the child dislikes the piano and therefore triggers him to behave in this way.	
		I try to calm the child down and uses PECS for him to choose different song since the last sessions he kept requesting songs.		
18 seconds	R.3.A.1	I play Michael Row A Boat to Shore.	The child chooses Boat Song. The child sings along.	The child is attending to the song.

19 seconds	I.3.B.1	From the song, I use the simple pattern in the song C, D, E and pause for the child to imitate.	The child refuses and keeps saying Boat Song.	
16 seconds	R.3.A.1	I play the Boat Song again.	The child watches and listens.	The child is attending to the song.
6 seconds	P.3.A.3	I then prompt him to play C, D, E.	He plays same note C up and down the octave. The child starts to request songs again.	
17 seconds	R.3.A.1	I play Five Little Monkeys.	The child requests Five Little Monkeys.	The child is attending to the song.
		When I ask him to play on the piano, he is very reluctant. It seems that the child only wants to listen to songs and refuses to play the piano.		

3.32 minutes	R.3.A.1	I play the songs requested by the child.	The child requests the song for the rest of the session. Most of the time he attends to the song and occasionally he will look away and yawn.	It is evident that the child loses interest in playing the piano and tries to avoid playing the instrument.

Appendix 13 – Child 7

Child 7

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
8 23 seconds	I.3.B.1	I start with nursery songs that the child likes.	The child starts to imitate my playing although not accurately.	This is the first time the child comes across the piano. It seems that the child is attracted by it and attempts to imitate my playing on the piano. Although not playing accurately, approximate imitation takes place here.
9 seconds	I.3.B.1	I play a simple rhythmic motif and pauses for the child to imitate.	The child imitates accurately (just the rhythmic motif not the notes).	The evidence shows that the child is able to imitate the rhythmic motif accurately which suggests that children with ASC perform better in joint attention skill when music stimuli is presented.
25 seconds	I.3.C.1	I assume that the child is waiting for me to respond. I then imitate the pattern played by the child and pause to see if the child recognises his	The child then plays a simple pattern and then pauses. The child shows no obvious response in recognising his patterns being imitated. When I pause, he starts to play another pattern again.	It seems that the child is seeking to interact with me rather than seeking me to imitate his playing. It is like a turn-taking activity. Moreover, the patterns that played by the child seems more random than an intention thought-out pattern.

		pattern being imitated.		
6 seconds	R.3.A.1	I then introduce repeated notes to the child.	The child is neither looking at me nor the piano.	The child is encountering sounds but not attending to it.
1.27 minutes	P.3.A.2	I use the hand-under-hand technique to support the child to create a simple pattern (repeated notes) on the piano. I try to hold his hand again.	The child tolerates the input but only for 37 seconds. He then pulls his hand away. The child refuses and he starts to play random keys on the piano.	It seems that the child cannot withstand the sensation of touch for a long time. Here, perhaps I should break the task down to a shorter session.
10 seconds	I.3.C.1	I imitate the pattern in return and pauses for the child to react.	The child recognises his own pattern being imitated where he smiles and plays the pattern again.	Here, it shows that the child starts to gain awareness of own sound being imitated.
43 seconds	P.3.A.2	I then use the hand-under-hand technique again to show the child another pattern that can be made from the piano (descending pattern of notes).	The child tolerates the input and looks at the piano consistently.	The child shows interest on what I am playing on the piano. This is showed through his facial expression as he is looking very attentively at what I am playing.
1.34 minute	P.3.C.1	I then hold his hand to introduce a descending pattern of notes with	At first, the child pulls his hand away but when I try again, he tolerates the	The child's interest in learning serves as a motivation for him to engage on the task. He is constantly looking

		regular change (different registers).	input and watches attentively.	attentively while I hold his hand to demonstrate playing descending pattern of notes on different registers.
25 seconds	P.3.A.2	I then hold the child's hand to play same notes up and down the octave.	At first, the child tolerates the input and then his attention reduced and pulls his hand away and plays random keys on his own.	Here, I interpret his action as he is eager to explore the piano.
15 seconds	R.3.A.1	I then play a simple pattern on the piano again (repeated notes).	The child watches attentively.	The child is attending to the sound.
29 seconds	P.3.B.1	I then start to play the repeated notes with a regular beat.	At first, the child seems to lose his concentration by looking around. However, his attention is then drawn to the pattern made by me. He then joins in playing on the piano with a regular beat.	The child is drawn to the regular beat played by me and starts to join in.
15 seconds	I.3.B.1	I then play the repeated notes once and pauses for the child to imitate.	When I pause, the child plays random keys on the piano. This then turns into a turn-taking activity instead of imitation activity.	The child may not understand what he is required to do and therefore no imitation is taken place. He, however, is keen to play on the piano and he

				waits for his turn when I am playing.
1.55 minutes	P.3.A.2	I then decide to introduce a new pattern to the child. I hold the child's hand and plays an ascending pattern of notes.	The child tolerates the input throughout. There are times that his attention sways away where he starts looking around the room but very quickly his attention is then drawn back to the piano.	Perhaps the task is too long, therefore, the child starts to lose his concentration halfway through. However, it seems that the child is keen to learn the instrument which motivates him to continue.
45 seconds	I.3.B.1	I then play a simple pattern C, D, E and pauses for the child to imitate.	The child imitates the materials and then when I play it again for the child to imitate, the child starts playing on random keys.	The child is able to imitate the materials I played which suggest that the child starts to develop imitation skill.
39 seconds	I.3.B.1	The activity is then turned into a turn-taking task rather than imitation task.	The child takes turn to play with me. No imitation is taking place.	It seems that the child really enjoys doing turn-taking task with me.
1.05 minutes	P.3.A.2	I then hold the child's hand to play different patterns that they have learnt in the lesson to reinforce what they have learnt today.	The child tolerates the input throughout and watches attentively.	The child is fascinated by the instrument and therefore is able to concentrate on the task for a long time.

9 19 seconds	R.3.A.1	I play repeated notes with a regular beat for the child to listen.	The child watches and listens attentively.	The child is attending to the sound.
37 seconds	P.3.A.2	The child requests to learn to play happy birthday as he likes the song happy birthday. I hold his hand to play the songs.	The child tolerates the input throughout and watches attentively.	Child's motivation and interest of a song serves as a great motivation for the child to stay focus on the task.
25 seconds	I.3.B.1	I play repeated notes and pause for the child to imitate. I play the pattern again and pause for the child to imitate.	The child watches but does not imitate. The child watches and then starts to imitate the pattern accurately.	The child needs extra time to process what is happening on the task.
22 seconds	I.3.B.1	I play repeated notes again and pause for the child to imitate.	The child watches but starts to play random notes on the piano.	No imitation takes place.
26 seconds	R.3.A.1	I decide to play nursery songs to lighten up the mood and in hope to motivate the child to engage on the task.	The child watches attentively and smiles throughout. He moves his body with the music as well.	Here, it shows that the child enjoys listening to the music I played.

1.02 minute	P.3.A.3	I want to see if the child remembers the ascending pattern of notes that the child learnt from the previous session. I play incomplete ascending pattern of notes and prompts the child to complete.	The child is able to complete the pattern. He even attempts to play the pattern without my support.	The child is able to remember the pattern he learnt from the previous session and that he is able to complete the pattern. After several attempts, the child is able to play the pattern independently without my help.
1.22 minute	P.3.B.1	I play repeated notes with regular beats.	The child joins in and starts playing repeated notes with regular beats (different notes).	The child is able to play regular beat together with me.
45 seconds	P.3.A.2 P.3.C.1	I then hold the child's hand to play same note up and down the octaves.	The child tolerates the input and watches attentively.	The child engages on task.
22 seconds	R.3.A.1	I demonstrate different patterns on the piano, playing two and three black keys up and down the piano.	The child watches and listens attentively.	The child is attending to the sound.
1.55 minutes	P.3.A.2	I hold the child's hand to play several patterns on the piano. First, two and three black keys up and down the piano. And then I play repeated notes up and down the octaves.	The child tolerates the input throughout and watches attentively. He then able to create the patterns without my help.	The child is very engaged on the task and keen to play and explore.

13 seconds	R.3.A.1	When I notice that the child has mastered to the patterns learnt, I show another pattern on the piano playing EEE, DDD, CCC.	The child is keen to play on the piano and therefore at first, he is not listening to the pattern, he is playing random keys on the piano. When I stop and say 'listen', the child stops and watches attentively.	The child is able to follow instructions. The fact that the child plays the same time while I am playing, it shows that the child is keen in playing. It does not seem to be the child is trying to block the sound I played.
53 seconds	P.3.A.2	I use hand-under-hand technique to play the pattern that I demonstrated, EEE, DDD, CCC.	The child tolerates the input and when I let go of the child's hand, the child creates the pattern himself and then they both play together.	The child seems to be improving on his skill on playing and that he is able to play at the same time with me (moving towards SoI level 4 perhaps).
9 seconds	R.3.A.1	I then demonstrate the pattern again when the child stops.	The child watches attentively and tries to play together with me.	The child wants to constantly play together with me. My playing motivates him.
35 seconds	P.3.B.1	I then hold the child's hand to play repeated notes with a regular beat.	The child tolerates the input and able to play repeated notes with a regular beat when I let go of his hand.	I notice that the child has a great sense of pulse.
9 seconds	I.3.B.1	I play the same note up and down the octave and pauses for the child to	The child imitates accurately.	Here, I am certain that the child is

		imitate.		capable of imitating accurately.
20 seconds	P.3.A.2	I decide to progress in teaching the geographical design of the piano, starting with learning C on the piano. I sing the note while playing as well to introduce the child that it is note C he is playing. I use the hand-under-hand technique.	The child tolerates the input and he sings together with me as well.	The child engages on the task.
10 4 seconds	I.3.B.1	I start the session by playing repeated notes and pauses for the child to imitate.	The child imitates immediately and accurately.	Here, it shows that the child is able to imitate me accurately. He is also more settled than the previous two sessions. It seems that he starts to familiarise himself with me and the structure of the session.
24 seconds	I.3.C.1	I assume that the child is seeking a response. I imitate the sound made by the child and wait to see his reaction.	The child then makes a sound on the piano (random keys) and pauses. The child starts to play another random key.	It is uncertain at this stage if the child is aware of his sound is being imitated. It seems that he is initiating to start a turn-taking activity rather than waiting for me to imitate his playing.

42 seconds	I.3.B.1	I then play various patterns that the child has learnt previously for him to imitate.	He imitates all the patterns accurately.	It seems that the child is able to remember the patterns he has learnt from the previous session which constitute him to imitate accurately.
7 seconds	P.3.B.1	I then decide to change activity and plays something fun for the child to learn. I clap a simple rhythmic motif for the child (regular beat).	The child imitates accurately.	The child is very into the activity during piano sessions. He is very engaged and able to perform all the tasks accurately.
4 seconds	P.3.B.1 I.3.B.1	I play repeated notes using the rhythmic motif.	The child imitates me.	
22 seconds	I.3.B.1	I continue to clap simply rhythms and pause for the child to imitate. I then play repeated patterns with regular change (different registers).	The child imitates the rhythms accurately. The child imitates accurately as well.	
8 seconds	I.3.B.1	I play repeated notes for the child to imitate.	The child imitates accurately again.	

1.50 minutes	P.3.A.2	I then hold the child plays same note up and down and repeated notes up and down the octave.	The child is able to tolerate input throughout and watches attentively.	The child seems to be very focused today and that he is very engaged on the task.
2.04 minutes	P.3.B.1	I then change strategy and materials. I play repeated notes with a regular beat.	The child plays together with me.	The child enjoys the task and able to stay focused for two minutes.
41 seconds	R.3.A.1	I decide to introduce a new song to the child (Do Re Mi) which involves learning scales (pattern) on the piano.	The child enjoys the music and he moves along with the music and smiling throughout.	The child enjoys listening to the new song I introduced. I assume that he is progressing towards Level 4 SoI however as there are still skills to learn on level 3 and so I decide to stay on the level so that the child can improve on what he is doing.
34 seconds	P.3.A.2	I hold the child's hand to play same note up and down the octave again to reinforce the materials that he has been learning.	The child tolerates the input and watches attentively. When I let go of his hand, he is able to play the note up and down the octave without support.	The child engages on task and is successful in completing the task on his own.
33 seconds	R.3.A.1	I play the new song again (Do Re Mi) for the child.	The child shows excitement while listening to the song and moves along	The child is attending to the sound and he seems to like it.

			with the music.	
37 seconds	I.3.B.1	I play simple patterns (repeated notes) for the child to imitate.	The child imitates accurately although halfway through his attention starts to reduce.	The child is able to imitate the materials accurately. Perhaps the child starts to feel tired after such a long session.
20 seconds	I.3.B.1	I decide to change pattern for the child to imitate (chords) to have more variety in the session.	The child is able to imitate accurately although not consistently.	It seems that the child's concentration starts to wear off.
28 seconds	P.3.C.1	I then hold the child's hand again to play repeated notes up and down the register to recap what they have been learning in this session.	At first, the child is reluctant for me to hold his hand but after several attempts, the child tolerates the input and focuses on the task.	
12 55 seconds	P.3.A.2	I start the session by holding the child's hand to play simple pattern up and down the octave (two black keys and three black keys).	The child tolerates the input and when I let go of his hand. He is able to play the pattern independently without support several times.	The child has now learnt to create a simple pattern on the piano and is able to play without the support from me.

42 seconds	P.3.A.2	I then hold the child's hand to play note C up and down the octave.	The child tolerates the input and when I let go of his hand. He is able to play the pattern independently without support several times.	
15 seconds	I.3.B.1	I then play simple patterns (repeated notes and ascending pattern of notes) for the child to imitate.	The child imitates accurately without any support.	The child has now understood the concept of imitation and is able to imitate me accurately without any support.
25 seconds	P.3.A.2	I hold the child to play the ascending pattern of scales from the song (Do Re Mi).	The child tolerates the input and sings the song along while I am playing.	The child shows fondness of the song.
12 seconds	P.3.A.2	I use hand-under-hand to support the child to play ascending pattern of scales again but with the correct fingering and technique at the same time.	The child tolerates the input.	I use the hand-under-hand technique to support the child to learn the ascending pattern with correct fingering technique, with this strategy, the child is able to feel the movement of each finger.
18 seconds	R.3.A.1	As the child shows enjoyment in singing the song as well, I decide to	The child watches attentively and sings along with me.	The child shows fondness of the song is attending to the task.

		play the song again and sings along with the child.		
1.05 minute	P.3.A.2	I hold the child's hand to play the ascending pattern of notes.	The child tolerates the input and sings along the song while I am playing. When I let go of the child's hand, the child plays the pattern accurately without any support.	Here, it shows that scaffolding is essential at the initial stage of the learning process of the child, once he has mastered the skill, he is able to create the simple pattern independently.
18 seconds	I.3.B.1	I play repeated notes for the child to imitate.	The child watches attentively and his first imitation was not successful. When I demonstrate again, he manages to imitate accurately.	The child is still at the stage in learning to imitate accurately.
13 seconds	I.3.B.1	I then play the short motif that is introduced on the previous session.	The child imitates accurately and starts to create other patterns based on the materials.	It seems that the child is improvising on the materials?
1.07 minutes	P.3.A.2 P.3.C.1	I then introduce a new pattern for the child to learn. (interval of 5^{th} C and G).	The child tolerates the input and learns to play the new pattern. When I let go of his hand, he manages to play the pattern without support.	The child enjoys creating patterns on the piano.

27 seconds	I.3.B.1	I play repeated notes for the child to imitate.	The child watches and imitates accurately.	
56 seconds	I.3.C.1	I assume that the child is seeking a response and so I imitate the pattern.	The child then creates a short pattern, three notes C, D, E and pauses and looks at me. The child plays the patterns again and this turns into turn-taking activity.	The child recognises his own sound is being imitated and that he smiles and then plays the motif again.
37 seconds	I.3.B.1	I take turn and plays simple motif C, D, E and pauses for the child to imitate.	The child imitates accurately in return.	Here, it shows that the child has started to improve on his imitation skill as his imitation is getting more accurate.
7 seconds	I.3.C.1	I imitate his playing.	The child then plays random keys on the piano and pauses again. The child does not respond.	The child is unaware of his own sound being imitated.
32 seconds	P.3.A.2	I reinforce the materials they have learnt previously (ascending pattern	The child plays the pattern accurately.	Here, it shows that the child remembers what he has learnt before

	P.3.A.3	of notes). I prompt the child to play the pattern.		and is able to follow my instructions.
13 1.25 minutes	P.3.A.2 P.3.C.1	I hold the child's hand to play simple patterns up and down the octave (two black keys and three black keys).	The child tolerates the input and when I let go of his hand. He manages to play all the patterns on his own.	The child remembers the materials he has learnt previously and is able to play independently without my support.
30 seconds	R.3.A.1	I play the Do Re Mi song again.	The child watches attentively.	The child is attending to the song.
9 seconds	I.3.B.1	I show the first part of the song for the child to imitate.	The child watches attentively but unsuccessful in imitating.	It seems that the material is too complicated and challenging for the child to imitate.
42 seconds	P.3.A.2	I hold the child to complete the short motifs.	The child tolerates the input and watches attentively.	Since the material is slightly advanced for the child to imitate, I support the child to learn the materials by holding his hand. The child is moving towards level 4 of SoI.
46 seconds	P.3.A.2	I then continue to support the child to play simple pattern up and down the	The child tolerates the input and is able to play the pattern with my support at	The child has improved on his memory and the skill in creating patterns on the

		octave (interval of 3rd C and E).	the end of the task.	piano. After supporting the child in playing the pattern, he is able to play independently without any support.
20 seconds	I.3.C.1	I imitate the child's playing to see if he recognises his own sound being imitated.	The child then initiates interaction by playing random keys on the piano and pauses for me to respond. The child continues to play other random keys, and this turns into a turn-taking activity.	The child has no recognition of his own sounds being imitated. I recognise that this is a complex process and that the child may need time in improving the skill.
1.34 minutes	P.3.A.2	I then use hand-under-hand technique to teach ascending and descending pattern of notes again. I sing as well while playing.	The child joins in and sings in tune. He watches attentively and tolerates the input.	The child enjoys the task very much and is able to play almost with accurate fingering when I let go of his hand.
34 seconds	P.3.B.1	I hold the child's hand to play ascending and descending pattern of notes with a regular beat.	The child plays together with me and keeps the regular beat.	The child has already developed a good sense of pulse at this stage.
1.33 minutes	P.3.A.2	I continue to hold the child's hand to play ascending and descending	The child tolerates the input and then he starts to play ascending and descending patterns by himself without any	The child has now able to play the patterns independently.

		pattern of notes.	support.	
1.03 minutes	I.3.C.1	I imitate the pattern played by the child.	The child then plays random keys on the piano again and pauses.	The child has no awareness of own sound being imitated.
44 seconds	I.3.B.1	I then play the pattern again for the child to imitate.	The child imitates the simple pattern accurately.	Here, one can see that the child is able to imitate other's playing but not recognising own sounds being imitated. This may be due to deficit in joint attention skill and understand own intentions.
34 seconds	I.3.C.1	I try again imitating the child's playing.	The child plays random keys on the piano again. When I respond, he watches but no response.	It seems like the child is still unaware of his own sound is being imitated.
22 seconds	R.3.A.1	I play Do Re Mi song again for the child to listen.	The child watches and moves along with the song.	The child shows keen on the song.
2.13 minute	P.3.A.2	I then hold the child to learn some of the short motifs in the song.	The child tolerates the input and he has a keen sense of concentration.	

1.54 minute	P.3.A.2	Once I feel that it is enough for the child to learn the motifs, I recap the patterns they have been learning (interval of 3rd C and E) and C, D, E.	The child tolerates the input throughout and is able to play the patterns without my support.	It shows that the child is now able to create simple patterns on the piano. His progress shows that he is slowly progressing towards level 4 of SoI.

Appendix 14 – Child 8

Child 8

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 35 seconds	R.4.A.1	I play a short motif for the child – I Can Sing a Rainbow.	The child watches and listens attentively. She starts to imitate my motif on a different register.	The child encounters sound and attends to it. She reacts with imitating my motif.
35 seconds	I.4.B.1	I observe.	The child imitates the short motif that I play accurately.	It is fascinating to see that the child is able to imitate the same note without any support. I start to suspect that the child perhaps possesses absolute pitch.
6 seconds	P.4.A.2	I demonstrate the motif again.	First, the child watches and then looks away.	It appears that the child is distracted. Perhaps she is still new to the instrument and me, therefore, she is trying to 'make sense' what is going on.
10 seconds	P.4.A.1	I hold the child's hand to play the motif again.	The child tolerates the input however she is not looking at the piano while we are playing.	
1.17 minutes	R.4.A.1	I decide to play several short motifs	The child watches attentively.	The child's concentration is now back

		for the child to listen – Rodeo, La Cucaracha, and improvise on some short motifs.		to the piano again. Perhaps she starts to aware of what is happening at the moment.
47 seconds	I.4.B.1 I.4.D.1	I play one of the short motifs again (improvised material). I then play simultaneously with the child.	The child imitates accurately. The child plays simultaneously with me.	The child's advanced musical ability allows her to imitate my playing accurately and learn the materials easily. She is also able to play simultaneously with me which shows skills for level 5.
48 seconds	P.4.A.1	I then hold her hand to support her in playing the accurate notes.	She then tries to play the same motif again however unsuccessful. The child tolerates the input.	The child's interest music seems to motivate her in learning the materials. Moreover, her absolute pitch skill allows her to map the pitches she hears on the piano easily. It is the 'sound in her head' which drives her hand towards the piano. She is able to play the complete motif without any support.
28 seconds	I.4.C.1	Once the child is able to play the complete motif, I deliberately play the motif incompletely for the child.	The child completes the incomplete motif without my help.	It is only the first session, but one could see that the child possesses advanced musical skill and she is able to remember the motif without my

				help.
19 seconds	I.4.C.1	I deliberately play incomplete motif again.	The child completes the motif without any help.	
28 seconds	P.4.A.1	I then support the child to play another motif.	The child tolerates the input and watches attentively.	The child seems to be motivated to learn to play the new instrument.
29 seconds	I.4.B.1	I play the motif again but without supporting the child.	The child imitates the motif accurately.	
20 seconds	I.4.C.1	I deliberately play incomplete motif	The child completes the motif.	The child seems to have great memory skill.
29 seconds	I.4.D.1	The child and I play the motif simultaneously together.		The child is able to stay engaged on the task throughout. This is an advanced musical skill which implies hearing and concentrating on two parts at once (hers and my materials).
20 seconds	I.4.C.1	Once again, I deliberately play	The child completes the motif	It is evident to me that the child has

		incomplete motif.	accurately without any help.	absolute pitch with great memory skill as she is able to complete most of the task without my help.
1.01 minutes	P.4.A.1	I hold the child's hand to play the motif in octaves.	The child tolerates the input however she is not looking at the piano.	Although the child is not looking at the piano, perhaps she is internalising what we are doing.
29 seconds	I.4.B.1	I play the motif for the child to copy.	The child imitates accurately.	At this stage, the child's absolute pitch is an advanced skill for her as she is able to imitate the material easily and remember the material as well.
20 seconds	I.4.C.1	As the child shows recognition of the motif, I deliberately play incomplete motif for the child to copy.	The child completes the motif accurately.	
10 seconds	P.4.A.2	I cue the child to play short motif in octaves.	The child manages to respond to the cue and plays accurately.	The child is constantly engaged on the task and she seems very interested in the task as well.
51 seconds	I.4.C.1	I play another motif – Ode to Joy and deliberately plays incomplete motif for the child to complete.	The child completes all the motifs and at times, she plays simultaneously with me.	

1.42 minutes	P.4.A.1	I then hold the child's hand to learn another motif from BINGO.	The child tolerates the motif throughout and is able to play the motif without support after.	
1.18 minutes	I.4.C.1	I play I can sing a rainbow again for the child and deliberately play half of the motif.	The child completes the motif with my help.	
2 11 seconds	R.4.A.1	I start the session by playing the song that the child has been learning from the previous session – I Can Sing a Rainbow	The child immediately recognises when she looks at the piano and immediately imitate my playing.	It is evident that the child recognises the motif/song that we learn.
52 seconds	I.4.C.1	I then deliberately pause on each short motif for the child to complete.	The child watches and completes each motif accurately.	The child shows magnificent memory skill as she is able to remember all the motifs accurately. One can say that this is because she is familiar with the song as this is one of her favourite songs.
56 seconds	I.4.B.1 P.4.A.2	I then continue to teach another short motif from the song. I combine strategies. First, I allow the child to imitate my motif. When she struggles,	The child first imitates my motif, when she fails, she is able to respond to my singing and plays the right note.	Because of the child's absolute pitch skill, she is able to hear my singing and map the pitches on the piano

		I use prompting (sing) the motif for the child.		accurately.
41 seconds	I.4.C.1 P.4.A.2	I play incomplete motif to observe if the child is able to remember the materials and completes on her own.	She completes the motif however not always consistently accurate. I combine this strategy with prompting to help the child.	The child is constantly on task. One can see that her interest in music motivates her in staying on task all the time.
18 seconds	I.4.C.1	Once I see the child has mastered the motifs we learn, I change the song to – She'll be Coming Round the Mountain. I play incomplete motif for the child.	The child completes the motif with accurate notes.	
15 seconds	I.4.C.1	I repeat the task.	The child once again completes the motif with no error.	It is evident that the child has an advanced musical skill even without prior instrument training. One can see that by providing appropriate support and scaffolding, the teacher is able to foster the child's musical potential leading them on a fun musical path.
18 seconds	P.4.A.2	I then continue to expand some of the motifs from the song through	The child watches and engages through	As the child has perfect pitch, she is able to match the pitches I sing onto

		prompting. Pointing at the keys and singing the tune to the child at the same time.	playing the accurate notes.	the piano.
6 seconds	P.4.A.1	I hold the child's hand to reinforce the learning so that she can see accurately which notes to play.	The child tolerates the input and watches throughout.	The child's familiarity with me has allowed me to hold her hand to learn the materials. Perhaps it is her interest in learning the motifs that drives her to stay on task.
12 seconds	R.4.A.1	I continue to play the rest of the piece for the child to listen.	The child listens attentively.	The evidence suggests that children who are functioning at level 4 and above have a higher concentration and are able to listen to the music attentively as opposed to children who are functioning at level 3 and below.
19 seconds	R.4.A.1	As the child is a fast learner, I wish to expand her listening experience with a wide variety of repertoire. Here, I play another song – If You Happy and You Know It.	The child listens at first but she starts to find the keys that I am playing.	One can see that the child is not looking at the keys that I am playing, she is listening to the pitches and tries to figure out the note (mainly last note of each phrase).

49 seconds	P.4.A.2	I try to hold her hand to learn the motif. But the child is reluctant for me to hold her hand, so I provide cue by pointing on the keys.	The child follows the cues and plays the materials accurately.	Perhaps the child does not like the sensation of touch or she is more motivated to play this by herself.
1.23 minutes	I.4.B.1	Since the child does not allow me to hold her hand, I use this strategy to demonstrate the motif and allows ample time for the child to imitate.	The child watches and imitates the motif accurately.	With absolute pitch, the child is able to imitate the motif effortlessly.
5 seconds	I.4.B.1	I play the short motif for the child to imitate again.	The child is reluctant to imitate and starts to flip through my score indicating she wants another song.	The evidence suggests that the child has a strong preference when it comes to song, she will only engage if it is the song that she wants to learn.
13 seconds	R.4.A.1	I then play Five Little Speckled Frog that is chosen by her.	She listens attentively to the complete song.	
13 seconds	R.4.A.1	I then play another song Head Shoulders Knees and Toes for the child.	She listens attentively.	My intention is to provide a broad range of repertoire for the child to listen. These are the songs that she has been listening in class (Youtube) but not necessarily on the piano.

40 seconds	I.4.C.1	Using the song above, I play incomplete motif for her to complete.	The child is able to complete the phrase with accurate notes.	One can see that by using familiar songs, without scaffolding, the child is able to complete the motif accurately.
27 seconds	I.4.C.1	I play the same motif again for the child to complete.	The child is able to complete the motif with accurate notes.	
27 seconds	I.4.C.1	I repeat the task.	The child seems to wish to play the complete motif on her own however she is unsuccessful in figuring out the notes. When I try to help her, she pushes me away.	The child appears to be motivated to figure out the notes herself.
23 seconds	I.4.B.1	When the child stops, I continue the motif and deliberately stop for the child to complete.	Instead of completing the motif, the child copies the whole motif and complete the motif as well.	It is evident that the child is excelling in her piano learning. Here, no technique is involved yet as I am trying to teach the musicality first before proceeding in learning the techniques.
23 seconds	I.4.C.1	I deliberately play incomplete motifs for the child.	The child is able to complete most of the motifs, not all of them.	The child still needs some time in remembering all the materials.

13 seconds	R.4.A.1	I play another song for the child to listen – The Wheel on the Bus.	The child listens attentively.	
20 seconds	I.4.B.1	I end the session by playing short motifs of I Can Sing a Rainbow again for the child to imitate.	She imitates all the motifs accurately.	
5 1.26 minutes	I.4.C.1 P.4.A.2	I start the session with I Can Sing a Rainbow. I play incomplete motifs for the child.	The child completes most of the motifs independently however some she needs help where I prompt her to play the accurate notes.	Given that the child has only two sessions, it is impressive to see the child is able to remember most of the materials. It is understandable that the child may need more time to remember all of the materials.
35 seconds	P.4.A.1	Once the child completes the motifs, I hold the child's hand to create short motif, intervals of C and G up the octave.	The child tolerates the input.	As the child has no prior piano training, I intend to introduce patterns on the piano (basics) so that the child recognises that motifs can be played on the piano and so does the patterns.

28 seconds	R.4.A.1	I play Twinkle Twinkle Little Star.	The child immediately starts to copy my playing however unsuccessful.	It is evident that the child is eager to learn the song that she recognises.
6 seconds	I.4.C.1 P.4.A.2	I then divide the song into smaller motifs and deliberately play one incomplete motif for the child and prompts her to complete the motif.	The child completes the motif with my prompts.	I am using the strategy in helping the child to learn the motif and to remember the materials as well.
10 seconds	I.4.B.1 I.4.D.1	When I play the motif again, the child starts to imitate me.	The child imitates the complete motif and play simultaneously with me. She is playing in thirds.	The evidence shows that the child is able to harmonise the melody. It is fascinating to see that the child has such advanced music skill without any prior training.
6 seconds	R.4.A.1	I proceed to show another song – I'm a Little Teapot.	Surprisingly, the child picks up the tune immediately and starts to copy.	It is unknown if the child knows the song prior to the session however it is amazing to see how quickly the child is able to pick up the materials and starts to imitate.
17 seconds	I.4.B.1 I.4.D.1	I play the motif again.	The child imitates and plays simultaneously with me. She is once again playing in thirds.	It is interesting to see that the child chooses to play the materials in thirds, it is unknown where the idea is coming

				from.
16 seconds	I.4.D.1	I encourage the child to play it again with me.	For the first half, the child struggles to find the correct note but then she manages while looking at my playing.	Here, it shows a more advanced skill of performing where both me and the child are performing simultaneously with one another. This implies hearing and concentrating on two parts at once and adjusting one's contribution to fit another's in real time.
11 seconds	R.4.A.1	I play another short motif for the child (ascending pattern of notes).	The child watches and listens attentively.	The child is attending to the sound.
17 seconds	P.4.A.1	I hold the child's hand to create an ascending pattern of notes.	The child tolerates the input.	Here, as mentioned above, as a teacher, I would like the child to learn not only to create motifs on the piano but also recognise patterns on the piano.
20 seconds	P.4.A.1	I hold the child's hand to create descending patterns of notes.	The child tolerates the input and manages to play without support.	
19 seconds	I.4.B.1	I play a short motif in thirds since the child has been playing the motifs we learn in thirds.	The child imitates and starts to play the motifs on a different register.	It is unknown if the child deliberately plays the motif in a different register or that she is choosing a random range to

				play the motif.
25 seconds	R.4.A.1	I play another song – Lavender Blue for the child.	The child listens attentively.	The child is attending to the sound.
10 seconds	P.4.A.1	I hold the child's hand to learn the motif from Lavender blue.	The child tolerates the input and continues the rest of the motifs.	It seems that the child has an extraordinary memory where she is able to play the rest of the motifs when she has only heard the song once. Or perhaps she already knew the song before.
33 seconds	P.4.A.1	I hold the child's hand again to play the motif.	The child first tolerates the input but then starts to pull her hand away. She starts to play something else.	It appears that the child is distracted, perhaps she has another song in mind or that she does not like the song.
17 seconds	I.4.C.1	I then change to I Can Sing a Rainbow as that is the motif that the child plays while we are learning Lavender Blue.	The child completes all the motif.	One can see that using the child's favourite song motivates her to stay on the task.
30 seconds	R.4.A.1	I play a new song for the child.	The child is not listening and starts to	I take this as a sign of the child dislikes

			bang on the piano and look away.	the song I play.
38 seconds	R.4.A.1	I decide to try it again.	First, the child looks at me but then she starts turning away and looks around.	It seems that the child is not very interested in the song that I am currently playing.
29 seconds	I.4.C.1	I play I'm a Little Teapot again for the child to complete the phrase.	The child is unable to complete the phrase.	The child appears to be distracted and tired. Perhaps the child has a short attention span.
23 seconds	R.4.A.1	I play multiple songs for her to listen since she is tired to engage in playing on the piano.	The child is drawn to the music and starts to turn her head and look at the piano but very quickly her attention starts to drop.	The child is attending to sound but not consistently throughout.
25 seconds	R.4.A.1	I then play the songs again.	The child immediately picks up one of the songs 'She'll be coming round the mountain' that the main pitch is in G and starts to play together with me in accurate tempo.	It seems like one of the songs catch the child's attention and draws her to the piano and engage on the task.

38 seconds	I.4.C.1	I deliberately play She'll be coming round the mountain incomplete motif.	The child completes the motif.	
36 seconds	I.4.B.1	I play a new short motif (Rodeo) for the child to copy.	The child imitates the complete motif accurately.	It is evident that if the child is interested in the task, he or she will engage on the task for an extended period. This can be seen on Child 8 disengages on task when I play the song that she dislikes.
19 seconds	I.4.B.1	I repeat the task to reinforce her learning.	The child imitates the complete motif accurately again.	
6 36 seconds	I.4.C.1	I start the session with I Can Sing a Rainbow again.	The child completes the phrase without any support.	It is evident that the child is familiar with the task and me now. She is also able to remember the materials by now.
24 seconds	P.4.A.1	I hold the child's hand to correct some of the motifs in the song.	The child tolerates the input.	Although the child is familiar with the material, she does not always play accurately. Here, by providing appropriate guidance, the child will be able to learn the correct materials.
38 seconds	I.4.B.1	I continue with the motifs.	The child imitates the whole motif	It seems like the child has another song

	I.4.C.1		sometimes and then complete the incomplete motif. She then starts to play something else.	in mind.
20 seconds	I.4.C.1	Since the child plays another motif, I decide to play incomplete motif for her to continue deliberately.	The child is not successful in completing the phrase.	It appears that the child is feeling distressed and distracted. Perhaps she is coping with the transition of the task.
20 seconds	I.4.C.1	I play it again.	The child is able to focus now and complete all the motifs.	Perhaps she needs time to settle in the session.
33 seconds	I.4.C.1	I play Twinkle Twinkle Little Star for the child to complete the motifs.	The child is able to complete the motifs however she seems to be more interested in playing the complete motifs on her own.	The child is processing the chunks of motif as a whole which suggests that perhaps she is moving towards level 5 of SoI.
19 seconds	P.4.A.1	I assist the child by holding her hand to play the accurate notes.	She tolerates the input.	
24 seconds	R.4.A.1	Once the child completes the motifs, I proceed to play I'm a Little Teapot for	She immediately joins in trying to play simultaneously with me but not always	Music motivates the child to engage on task. Her enthusiasm in learning to

		her.	accurate.	play is shown throughout the sessions.
24 seconds	I.4.C.1	I play an incomplete phrase for the child to complete.	The child completes the phrase without support.	At this stage, I am confident that the child appreciates music comprises distinct 'chunks' of material.
32 seconds	I.4.C.1 I.4.B.1	I repeat the task.	The child completes the phrase. However she also starts to imitate the whole motif instead of completing them.	
16 seconds	I.4.B.1	I play the last motif of the song.	The child imitates the motif accurately on her own without support.	The child is capable of engaging in a musical task without my support.
14 seconds	R.4.A.1	I play Lavender Blue for the child again.	She listens attentively.	The child is attending to the sound.
53 seconds	I.4.B.1 I.4.C.1 P.4.A.2	I then prompt the child to imitate the short motifs.	The child's concentration seems to drop, she is unable to stay on task and imitates my playing.	I combine strategies to assist the child in learning the materials however it seems that the child has a short attention span.

			The child seems to be distracted today as she starts to play on random stuff around the piano. It is difficult to get her back on the piano.	
31 seconds	R.4.A.1	I decide to play another song for the child to listen – The Entertainer.	The child's attention is drawn to the music. She listens and watches attentively.	It seems that self-motivation is an important notion here.
1.28 minutes	I.4.B.1	I then play short motifs for the child to copy.	The child stays on task and imitates the motif although not always accurately.	
9 seconds	P.4.A.1	I hold the child's hand to play the motif with accurate notes to reinforce her learning.	She tolerates the input.	
26 seconds	I.4.B.1	I play the motif again.	The child imitates accurately.	
22 seconds	R.4.A.1	I play She'll be Coming Round the Mountain again.	The child recalls the song is in G and starts to play G simultaneously with me.	

7 1.20 minutes	I.4.C.1	I start the session with motifs from I Can Sing a Rainbow.	The child completes the phrase accurately.	It is clear at this stage that the child knows what to expect and engages on the task.
1 minute	I.4.C.1	I repeat the task.	The child completes the phrase accurately.	
15 seconds	R.4.A.1	I then proceed to play Lavender Blue which the child listened from the previous session.	The child watches and listens attentively.	
15 seconds	I.4.B.1 I.4.C.1	I play the motifs from Lavender Blue.	The child imitates and also completes the motif which I deliberately stop.	I am reinforcing all the materials the child has been learning and guides her to learn the materials with higher accuracy, therefore, repeating the task several times.
20 seconds	I.4.B.1	I then continue to play ascending pattern of notes from the previous session.	The child imitates accurately.	It is unclear if the child notices this is a pattern rather than a motif. It seems like she is imitating purely for musical

				pleasure.
36 seconds	I.4.B.1	I then play octaves C from bottom to the top.	The child first imitates accurately. Her attention then drops again.	Perhaps the child is still coping with the transition of task. Or that she dislikes the material that we are playing.
31 seconds	I.4.C.1	I change the song to If You Happy and You Know It and deliberately play incomplete motifs for the child.	The child manages to complete all of them.	It appears that the child is motivated by the song that she likes or familiar with.
21 seconds	I.4.C.1	I play the above song again and deliberately play incomplete motifs for the child.	Once again, she completes all accurately.	
21 seconds	I.4.C.1	I then change to another song Twinkle Twinkle Little Star.	The child completes the first motif but when she is asked to complete the second motif, she starts to play random keys on the piano.	It seems that the child has a short concentration span or she is not keen in playing this particular song.

18 seconds	R.4.A.1 I.4.D.1	I introduce a new song to the child – Gummy Bear. However, this is not an entirely new song to her as she listens to the song in class (Youtube).	The child's attention is drawn to the song and starts to join in although she is not playing the correct notes.	As mentioned above, the child is motivated by the song she knows or likes.
21 seconds	I.4.D.1	I allow the child to play simultaneously with me.	The child watches and tries to imitate the notes however not always accurate. She is however on task and engages with me.	Although the child is not playing the exact note, she is neither playing random keys on the piano. She is constantly looking at my playing trying to imitate.
24 seconds	R.4.A.1 P.4.A.2	I then decide to introduce another new song to the child – Five Little Monkeys.	The child listens attentively and when the child struggles to play, I provide cue to help the child.	One can see that strategies are combined to assist the child in learning the materials.
2.22 minutes	P.4.A.1 P.4.A.2 I.4.B.1	I continue with I Can Sing a Rainbow. First, I hold her hand but she is not able to tolerate and so I cue her to play the materials or imitates my playing.	The child is unable to tolerate the input, she is, however, able to respond to the cues and play the accurate notes.	Perhaps the child dislikes the sensation of touch or that she is motivated to figure the materials out on her own.
33 seconds	I.4.C.1	I play incomplete motifs for the child to complete (I Can Sing a Rainbow).	The child is able to complete the motifs this time.	

15 seconds	R.4.A.1	I then play a new motif for the child – Rain is Falling Down.	The child watches and listens attentively.	The child is attending to sound.
8 1.04 minutes	I.4.C.1	I start the session with I Can Sing a Rainbow.	The child is feeling very distressed today. She comes into the session crying non-stop and constantly saying no. She demands Goodbye Song at the start of the session.	Teaching assistant says that she has been acting very distress today perhaps due to not feeling very well.
1.04 minutes	I.4.C.1	I continue the task and prompt the child to complete the motifs again.	She manages to complete the task despite she is constantly crying at the same time.	Although the child is feeling distressed, it does not affect her musical ability.
29 seconds	P.4.A.1	I hold the child's hand to play ascending pattern of notes that we learned from the previous session.	She tolerates the input but not looking at the piano.	
17 seconds	I.4.C.1	I then proceed to play Lavender Blue.	The child completes the motifs.	

16 seconds	I.4.C.1	I decide to do it again but the child is constantly crying and shouting.	The child demands for Goodbye Song and wishes to go back to class.	The lesson has to terminate due to the child is feeling very distress.
10 55 seconds	P.4.A.2	I start the session with I Can Sing a Rainbow. The child seems to forget some of the motifs. I cue the child to play accurate notes.	The child struggles to play the motif accurately. But she is able to respond to my cues and complete the task.	Perhaps the child misses some of the lessons contributes to her lack of practice and thus leading to her start to forget some of the materials.
27 seconds	R.4.A.1	I play the Rainbow song again for the child.	The child listens attentively.	Perhaps the child is still transitioning from the previous task to the current piano session.
39 seconds	I.4.C.1	I deliberately play incomplete Rainbow motifs for the child to complete.	The child completes the motif and is on task all the time.	The child starts to settle down and engages on the task.
33 seconds	I.4.C.1	I decide to play a new song for the child however this is not an entirely new song to the child as I gather information from the music teacher that they have been learning this song in music lesson and the child is able to play the motifs accurately on the	The child recognises the song is able to complete the rest of the motifs without my help.	One can see that with absolute pitch, one can easily transfer the skill and play the correct materials in any instrument.

		xylophone. I decide to transfer the material here. (Michael Row a Boat to Shore).		
17 seconds	P.4.A.1	I hold the child's hand to learn the rest of the motifs from the song.	The child tolerates input and watches.	The child is able to engage on the task and she seems to be keen in learning the materials.
18 seconds	I.4.C.1 I.4.D.1	I then deliberately play incomplete motifs for the child.	The child completes motifs and continues the rest of the motifs by playing simultaneously with me.	
17 seconds	I.4.C.1	I proceed to play If You Happy and You Know It.	The child completes all the motifs.	The child is very familiar with the song now and able to complete all the motifs without any support.
18 seconds	R.4.A.1	I decide to reinforce the learning materials of Michael Row a Boat to Shore.	The child listens attentively and starts to sing while I play.	The child is attending to the song.

39 seconds	P.4.A.1	I support the child to play the song again by holding her hands so that she is able to play all the materials accurately.	The child tolerates the input.	
27 seconds	P.4.A.2 I.4.C.1	I encourage the child to play the song once again before we end the session.	The child starts to feel distressed and demands for Goodbye Song. However, she manages to complete the song and responds to my cues before we end the session.	The child seems to have a very short concentration span.
11			The child comes into the session crying again and feeling very distress. While asked to play on the piano, she starts to play random keys on the piano.	
40 seconds	I.4.C.1	I start playing I Can Sing a Rainbow in hope to draw her attention to the piano.	She starts to play random keys and cannot concentrate to be engaged on the task. I repeat the task and encourage the child to complete the motif; she then manages to complete the motif.	Perhaps the child is feeling unwell today or she is coping with the transitioning of the task.
1.54 minutes	I.4.C.1	I continue to play the motifs again.	Here, one can see the child engages in	Here, I combine several strategies to

	I.4.D.1 I.4.B.1 P.4.A.2		several ways. First, she completes the motifs when I deliberately stop. She then continues by playing simultaneously with me. When she encounters motifs that she cannot remember, she starts to imitate my material.	help the child in recalling the motifs that we learn.
16 seconds	R.4.A.1	I play Twinkle Twinkle Little Star for the child.	Once again, the child demands Goodbye Song.	It seems that this has become a routine that the child is constantly demanding Goodbye Song when we have just started the lesson. Perhaps the child loses interest in learning the piano.
12 seconds	R.4.A.1	I decide to play the song again.	This time, the child watches attentively.	The child is attending to the song.
6 seconds	I.4.B.1	I play a short motif from Twinkle.	The child copies accurately.	
12 seconds	P.4.A.1	I then hold the child to learn the rest.	The child tolerates the input however halfway through, she pulls her hand away and completes the motif by herself.	Here, it shows that the child is motivated to complete the task independently.

1.01 minutes	I.4.C.1 I.4.B.1 I.4.D.1	We continue to play Twinkle motifs.	The child imitates the motif I play and then when I stop, she completes the motif. She is also able to play simultaneously with me as well.	
23 seconds	P.4.A.1	I hold the child to play ascending pattern of notes.	She tolerates the input and manages to play the material again independently. She then demands for Goodbye Song.	I have to end the session as the child starts to cry and feel distress.

Appendix 15 – Child 9

Child 9

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 25 seconds	I.4.B.1	I play a short motif from She'll be Coming Round the Mountain and pause for the child to copy.	The child imitates the first half and then stops. He then smiles at me and starts to glide the keys.	I recognise that children with ASC exhibit deficit in joint attention thus leading to failure in imitation or doing it less accurately and frequently. It is through many repetitions that the child will grasp the concept.
39 seconds	R.4.A.1	I start to improvise a short motif starting on A.	First, the child listens attentively and watches. His attention then sways away where he starts to look at somewhere else.	The child has a short attention span. This is common among children with ASC.
1.05 minutes	I.4.B.2	I then play If You Happy and You Know It and use the short motif and cue the child to imitate.	The child imitates successfully.	Using songs that the child is familiar with helps to reinforce their learning. Moreover, as the child fails to imitate previously, it is worth to provide support (cue) to help the child in the understanding of imitation.

25 seconds	I.4.B.1	I play the motif again and pause for the child to imitate.	The child imitates successfully.	Here, it shows that by providing appropriate support, the child is able to learn the concept of imitation.
32 seconds	P.4.A.1	I then hold the child's hand to play another short motif – ascending pattern of notes.	The child tolerates the input, and he is able to play the motif without support after.	Using kinaesthetic modality, it helps the child to feel the movement and looks carefully which exact note to play.
20 seconds	I.4.C.1	I deliberately play incomplete motif (Ascending pattern of notes) for the child to complete.	The child is not able to complete. When I try again, he manages to complete.	Perhaps delay in processing.
			The child starts to interrupt the session, looking around and talking randomly. He is reluctant to play when I cue.	
29 seconds	I.4.C.2	I then try again and cue the child to play the short motif again.	With cue, the child plays the motif accurately.	It seems that the child is still developing his imitation skill. At the moment, he requires support in imitating the motif.

29 seconds	R.4.A.1	I then play Twinkle Twinkle Little Star for the child.	The child listens and observes.	The child is attending to the song.
			The child starts to glide the keys randomly.	It seems like the child is exploring the instrument since this is his first encounter of the piano.
22 seconds	P.4.A.1	I support the child to play short motifs, EE, DD, C.	The child tolerates the input.	
17 seconds	R.4.A.1	I play the short motif for the child again.	The child observes.	The child is attending to the motif.
4 seconds	P.4.A.1	I hold the child's hand to play the motif again.	The child tolerates the input.	
			The child then starts to play ascending pattern of notes C, D, E, F, G.	The child remembers the materials that we learned previously.

38 seconds	R.4.A.1	I play another short motif for the child, Rodeo.	The child watches but not consistently.	Perhaps the duration is too long for the child to stay focus.
1.11 minutes	P.4.A.1	I hold the child's hand to play the motif.	The child tolerates the input throughout.	
			For the rest of the session, the child is exploring the piano such as pressing random keys, gliding the keys. He is not focusing on the task.	Since it is the first session for the child, I allow the child to explore the instrument.
2 25 seconds	I.4.C.1	I start the session with an ascending pattern of notes. I deliberately stop halfway and pause for the child to complete.	The child starts to press random keys on the piano.	The child has yet to understand what to do in the session. Perhaps he does not remember the materials as well.
1.07 minutes	I.4.B.1	I play descending pattern of notes and pause for the child to imitate. I repeat the task several times to reinforce his learning.	The child imitates but not entirely accurate. The child stays on task the entire event.	I am teaching the child imitation skill and it is through many repetitions that the child will start to grasp the concept.

15 seconds	R.4.A.1	I then play another motif for the child to listen – Rodeo.	The child observes.	The child is attending to the sound.
			The child starts to play random keys on the piano. While I try to direct him back to the session, he starts to glide the keys.	It seems that the child is still exploring the piano.
29 seconds	I.4.B.1	I play a short motif EE, DD, C for the child again to imitate.	The child starts to glide the keys instead of imitating.	At this stage, it is unclear what is the child trying to do.
31 seconds	I.4.A.1	I decide to imitate in return to observe if the child recognises own sound being imitated.	The child looks away.	The child has yet to develop an awareness that his sound is being imitated.
22 seconds	I.4.B.1	I play a short motif EE, DD, C for the child imitate again.	The child imitates E, D, C. Although not entirely correct, it seems that the child starts to develop imitation skill. The child starts to glide the keys.	It seems that the child enjoys gliding the keys very much.

13 seconds	I.4.A.1	I glide in return to see if the child notices.	The child is neither looking at the piano nor me.	The child has yet to develop an awareness that his sound is being imitated.
1.04 minutes	P.4.A.1	I decide to hold the child's hand to play the motif.	The child tolerates the input. He then pulls his hand away and starts to play random keys on the piano again.	
3 3 seconds	R.4.A.1	I introduce a new motif for the child to listen – La Cucaracha.	The child watches and listens attentively.	The child is attending to the motif.
21 seconds	R.4.A.1	I play motif from The Entertainer.	The child watches and listens attentively.	
17 seconds	R.4.A.1	I play another motif from Radetsky March for the child to listen.	The child does not seem to be listening. He starts to look around and playing on the piano while I am playing.	The reason I play another motif for the child is to provide a wide range of motifs for the child to listen so that he can learn. The child is encountering sound but not attending to it.

26 seconds	R.4.A.1	I play the motif again.	The child's attention is drawn back to the piano, and he watches. He then tries to imitate my playing.	The child is attending to the motif I play.
5 seconds	I.4.B.1	I play the short motif for the child to imitate.	The child looks at my playing, but he cannot imitate at all.	The child has yet to grasp imitation skill. I understand it is through many repetitions that the child will become better.
9 seconds	I.4.B.1	I decide to change to another motif that may be easier to imitate – La Cucaracha.	The child imitates successfully.	Perhaps the material is more comfortable for the child to imitate and remember.
7 seconds	R.4.A.1	I play the motif again for the child (La Cucaracha)	The child watches and listens attentively.	The child is attending to the motif I play.
5 seconds	I.4.B.1	I play the motif again for the child to imitate.	The child fails to imitate although he seems to be trying.	
7 seconds	I.4.B.1	I repeat the task.	The child does not look at my demonstration. He starts to look	It seems like the child's attention starts to drop.

			around the room.	
2 seconds	I.4.B.1	I repeat just the first half of the motif.	The child manages.	Perhaps the child needs to start with a shorter version of the motif.
6 seconds	I.4.B.1	I repeat.	The child manages to copy the first half of the motif.	
4 seconds	I.4.B.1	I repeat the motif.	This time, the child manages to copy the whole motif accurately.	
11 seconds	R.4.A.1	I play the remaining motif for the child to listen.	At first, he looks at the piano, his attention then sways away and he starts to look around the room.	The child has a short attention span.
7 seconds	I.4.B.1	I play the motif again for the child to copy.	The child manages to copy the motif this time.	One can see that it is through many repetitions that the child will start to grasp the task.
12 seconds	R.4.A.1	I play the motif several times for the child to listen. This is to	The child listens attentively.	The child is attending to the motif I play.

		reinforce his learning.		
5 seconds	I.4.C.1	I deliberately play an incomplete motif and pause for the child to complete.	The child starts to play random keys.	It seems like the child has no idea that he needs to complete the motif. He may think that it is his turn to play.
8 seconds	I.4.A.1	I copy the child.	The child looks at my playing and smiles.	It seems like the child starts to be aware that his sound is being imitated.
10 seconds	I.4.B.1	I play La Cucaracha for the child to copy again.	The child is only able to imitate quarter of the material. He then starts to play on random keys.	Perhaps the child has a very short memory.
5 seconds	I.4.A.1	I copy his playing again.	Once again, he looks at me and smiles.	The child seems to be aware that his sound is being imitated.
4 seconds	I.4.B.1	I play the motif again.	This time, the child is able to imitate accurately.	As mentioned above, perhaps the child only able to imitate very short motif.
4 seconds	R.4.A.1	I play the motif for the child to	The child listens attentively.	The child is attending to the motif.

		listen again.		
5 seconds	I.4.C.1	I deliberately stop and pause for the child to complete the motif.	The child manages to complete the motif.	The child starts to remember the material.
13 seconds	R.4.A.1	I play remaining motif for the child to listen.	The child listens attentively.	The child is attending to the motif I play.
7 seconds	I.4.B.2	I play the motif and cue the child to imitate.	The child responds to the cue and imitates accurately.	I have decided to cue the child in imitating more extended motif.
11 seconds	I.4.B.1	I play the motif twice again.	The child imitates accurately twice.	The child seems to start remembering the materials.
10 seconds	R.4.A.1	I reinforce the learning by repeating the motif several times for the child to listen.	The child listens attentively.	The child is attending to the motif I play.
32 seconds	R.4.A.1	I play motif from The Entertainer.	The child smiles and observes.	It seems like the child recognises the motif and he shows fondness to it.

16 seconds	I.4.B.1	I play the motif for the child to copy.	The child only manages to copy some of the materials however he stays engaged on the task throughout the event.	Approximate imitation takes place here.
7 seconds	P.4.A.1	I decide to hold the child's hand to reinforce the learning.	The child tolerates the input and then pulls his hand away.	
6 seconds	P.4.A.2	I cue the child to play the motif.	With cue, the child is able to play accurately.	I change the strategy since the child is not able to tolerate the input anymore.
15 seconds	R.4.A.1	I play the motif again for the child to listen.	The child watches and smiles.	The child likes the song and he is attending to it.
4 seconds	P.4.A.2	I prompt the child to play the motif.	The child responds to the prompt and plays the correct notes.	
32 seconds	R.4.A.1	I play the motif several times for	The child moves with the music and	The child is attending to the motif.

		the child again.	smiles.	
45 seconds	R.4.A.1 I.4.B.1	I play a new motif for the child to listen — motif from Beethoven Symphony no.5.	The child imitates the short motif accurately several times.	The material is short and easy to imitate.
6 seconds	P.4.A.1	I hold the child's hand to play the motif to reinforce his learning.	The child tolerates the input.	
10 seconds	I.4.B.1	I play the motif for the child to copy.	He manages to copy accurately.	
21 seconds	I.4.B.1	I play the motif several times for the child to copy.	The child manages to copy the rhythms but not the notes.	It seems that the child has yet to remember the pitches. Or he fails to observe which exact notes to copy.
8 seconds	I.4.B.2	I use the cue to help the child to imitate the correct notes.	The child successfully plays the right notes.	Prompt is a useful strategy to help children with ASC who fail to imitate or remember the materials.

8 seconds	I.4.B.1	I play the motif again.	The child looks away from the piano and starts pressing random keys.	It seems that the child's attention has dropped.
43 seconds	I.4.B.1	I repeat the task several times.	The child is only able to copy the rhythm most of the time not the notes.	
4 8 seconds	I.4.B.1	I play La Cucaracha for the child to imitate.	The child imitates accurately.	The child seems to gain familiarity with the task now.
6 seconds	R.4.A.1	I play the remaining motifs for the child to listen.	The child listens attentively.	The child is attending to the motif I play.
9 seconds	I.4.B.1	I play another motif from La Cucaracha for the child to imitate.	The child imitates accurately.	
7 seconds	I.4.C.1	I deliberately play half of the motif and pause for the child to complete.	The child does not look at my playing. He is looking around the room.	The child gets distracted.

7 seconds	P.4.A.1	I hold his hand to play the motif.	He tolerates the input.	
9 seconds	R.4.A.1	I play the remaining motif for him to listen.	He listens attentively.	The child is attending to the motif I play.
10 seconds	P.4.A.2 I.4.B.1	First, I cue the child to play the motif. I change strategy and play the motif again and pause for him to imitate.	The child is not responding to the cue. The child manages to imitate accurately.	Perhaps the child cannot remember the material accurately therefore even if I am providing the cue; he is not sure what to play.
9 seconds	P.4.A.1	I hold the child's hand to play the new motif from La Cucaracha again.	The child tolerates the input.	He seems to recognise it is a new motif as he smiles and looks at me while we play.
34 seconds	R.4.A.1	I play motifs from The Entertainer again.	The child immediately smiles when I play.	The child shows recognition of the motif.
11 seconds	P.4.A.1	I hold his hand to play the motif.	He tolerates the input and observes. He then pulls his hand away.	Perhaps the child cannot tolerate the sensation of touch for an extended

				period.
10 seconds	R.4.A.1	I play the motif again for him to listen.	He observes and smiles.	The child shows fondness to the song.
4 seconds	P.4.A.2	I cue the child to play the motif.	He responds to the cue and plays the right notes.	The child is motivated by the song perhaps.
11 seconds	I.4.B.1	I play the motif for the child to imitate.	He imitates accurately and engages in the task throughout the event.	
26 seconds	I.4.B.1	I play the motif again for the child to imitate.	The child does not imitate in return. He starts to play random notes.	It seems that the child's concentration is starting to drop.
23 seconds	P.4.A.1	I hold his hand to play the motif.	The child tolerates the input. The child manages to play half of the motif correct without prompt.	Perhaps the motif is too long for him to remember.
10 seconds	I.4.B.1	I play the motif again for the child	He manages to copy accurately.	The child is only able to imitate short

		to copy.		motif.
15 seconds	R.4.A.1	I introduce a new motif – Jelly on a Plate.	At first, the child watches attentively, and then he starts looking away.	The child has a short attention span.
6 seconds	I.4.B.1	I assume the child does not like the motif. I return to La Cucaracha for the child to imitate.	The child imitates accurately.	The child engages in the task when he is familiar with the material.
10 seconds	R.4.A.1	I play the remaining motif for him.	The child seems excited and moves with the music.	The child is attending to the motif I play.
11 seconds	I.4.B.1	I play the motif again for the child to copy.	He imitates the material accurately.	
6 seconds	I.4.C.1	I deliberately play half the motif and pause for the child to complete the rest.	He completes the motif without the cue.	The child starts to remember the material after several repetitions.

9 seconds	R.4.A.1	I play the motif for the child to listen again.	The child observes.	The child is attending to the motif I play.
5 seconds	I.4.B.1	I play the motif again and pause for the child to imitate.	The child starts to play random keys on the piano.	It seems that the child starts to get distracted, perhaps his attention has reduced.
10 seconds	I.4.A.1	I copy the child's material.	He watches and seems to recognise his sound is being imitated as he plays the material again.	The child has developed awareness of own sound being imitated.
26 seconds	I.4.A.1	I copy the child's material again.	The child watches and laughs.	Here, I am convinced that the child realises his sound is being imitated.
22 seconds	R.4.A.1	I play Rodeo motif several times for him to listen.	The child seems a little distracted as he starts to look around.	The task perhaps is too long for him to engage.
8 seconds	R.4.A.1	I play it again.	The child watches and starts to copy the last note.	The child is attending to the motif.

5 seconds	I.4.C.1	I deliberately play incomplete Rodeo motif for the child to complete.	The child starts to play la Cucaracha motif.	The child is still processing the material from previous events.
16 seconds	R.4.A.1	I play the motif for him – La Cucaracha.	He smiles and watches.	The child is attending to the motif.
13 seconds	I.4.B.1	I play La Cucaracha motif for the child to copy.	His attention starts to drop; he starts to look around and press on random keys.	
27 seconds	R.4.A.1	Since the child is unable to engage on the task anymore, I decide to play motifs (The Entertainer) for the child to listen.	The child immediately smiles showing recognition of the song.	The child is attending to the song.
5 12 seconds	I.4.B.1	I play La Cucaracha motif for the child to imitate.	He observes and imitates accurately.	The child has gained familiarity with the familiar and the task.
14 seconds	R.4.A.1	I play the remaining motif for the child to listen.	He does not always listen attentively. He will look around the room.	The child has a short attention span.

8 seconds	I.4.B.1 P.4.A.2	I play la Cucaracha motif for the child to imitate. I cue the child to play the material.	The child fails to imitate the material. With cue, the child is able to play the material accurately.	Occasionally, the child needs support in remembering the material.
8 seconds	I.4.B.1	I play the motif again.	The child manages to copy 90% of the material.	
24 seconds	P.4.A.1	I hold the child's hand to play the motif.	He tolerates the input.	I use another strategy to help in reinforcing his learning.
7 seconds	I.4.C.1	I deliberately play incomplete motif.	The child tries to complete but unsuccessful.	It seems like the child is not able to remember the material.
11 seconds	P.4.A.1	I hold the child's hand to help him.	He tolerates the input. When I let go of his hand, he manages to play the motif without support.	The child successfully plays the motif without support at the end. This suggests that with appropriate support, the child will be able to play motif independently.

22 seconds	I.4.B.1	I play the motifs several times for the child to copy.	The child imitates all accurately.	
13 seconds	I.4.B.1	I play ascending short motif for the child to copy.	The child watches and copies accurately.	
45 seconds	R.4.A.1	I play The Entertainer motif again.	The child immediately smiles when I play.	The child likes the song and he is attending to it.
27 seconds	P.4.A.1	I hold the child's hand to play the motif several times.	The child tolerates the input. When I let go, the child is not able to play the whole motif by himself.	The child is unsuccessful in remembering the material.
35 seconds	R.4.A.1	I play the motif again.	The child smiles and watches.	The child is attending to the song and he shows fondness of it.
13 seconds	I.4.A.1	I copy the child's material.	The child plays a short material on the piano. The child is aware of own sound being imitated, he smiles and plays	The child has now developed awareness of own sound being imitated.

			the material again.	
2.03 minutes	I.4.B.1	I turn this into an imitation game where I play short motif for the child to imitate.	The child imitates and stays on task throughout. He does not always imitate the right notes, but he is constantly focused on the task. In the end, he manages to imitate accurately.	The child and I attune to each other and form a meaningful interaction.
17 seconds	R.4.A.1	I play La Cucaracha motif again.	The child recognises the motif and smiles.	The child gains recognition of the motif now.
26 seconds	I.4.B.1	I play the motif several times for the child to imitate.	The child is unable to imitate and start to play random keys.	It seems that the child's attention starts to drop.
48 seconds	I.4.B.1	I decide to change to a simpler motif. Jelly on a Plate. I decide to improvise simple motif for the child to imitate.	The child manages to imitate. The child is able to imitate but not consistently. He seems quite distracted.	
18 seconds	R.4.A.1	I play the motif again.	The child is not listening attentively.	As the child cannot concentrate

			He is looking around.	anymore, I end the session for today.
6 1.13 minutes	R.4.A.1	I decide to extend his listening experience. I play the complete La Cucaracha for the child to listen.	The child first listens and observes. He then starts to look around and presses random keys on the piano.	I suspect that it may be due to the piece is too long for the child to concentrate.
11 seconds	I.4.B.1	I then play a short motif from La Cucaracha and pause for the child to imitate.	The child is not looking at my playing. He plays random keys.	It seems like the child is dealing with transitioning of the task. Or he wants to explore the piano.
14 seconds	P.4.A.1	I hold the child's hand to play.	The child cannot tolerate the input and pulls his hand away.	The child seems distracted and not ready to start the piano session yet.
11 seconds	P.4.A.1	I try it again.	This time, the child tolerates the input and play on the piano.	Perhaps the child needs time to settle in the session.
13 seconds	I.4.C.2	I play the motif for the child to imitate. I then play again and cue the child to play the exact note.	The child fails to imitate. The child manages to play the right notes.	

15 seconds	I.4.B.1	I play the motif again for the child imitate.	The child is reluctant after trying several times. The child is finally able to play without support.	The child seems to be distracted today.
37 seconds	I.4.B.1	I play the motif again several times.	The child manages to imitate but not consistently throughout the session.	
7 seconds	P.4.A.1	I hold his hand to play in hope to draw his attention back to the piano.	He cannot tolerate the input and pulls his hand away.	It is unknown why the child is behaving in this way today.
8 seconds	R.4.A.1	I play la Cucaracha for the child to listen.	The child manages to listen attentively this time.	The child is attending to the motif I play.
4 seconds	I.4.B.1	I play the motif again.	The child imitates accurately.	It seems like the child is starting to focus on the task now.
14 seconds	R.4.A.1	I play the motif again.	The child watches and listens attentively but halfway through his attention is attracted by the broken	

			keys on the piano and he starts playing with it.	
9 seconds	P.4.A.2	I then cue the child to play the motif.	I just cue the first note and the child is able to play the rest of the motif without any support.	Here, it shows that the child is able to remember the material now.
10 seconds	R.4.A.1	I play the motif again.	The child listens and watches attentively.	The child is attending to sound.
5 seconds	R.4.A.1	I play Rodeo motif for the child to listen.	He watches and listens attentively.	
11 seconds	P.4.A.1	I try to hold his hand to support him to play.	The child refuses.	The child is reluctant for me to hold his hand. Perhaps he is sensitive to touch today.
27 seconds	R.4.A.1	I play the motif from Beethoven Symphony No. 5 again.	He watches attentively and then tries to imitate the rhythmic motif again.	The child is attending to my playing.

			The child's concentration drops again where he starts to play random notes and refuse to engage.	
10 seconds	I.4.B.1	I decide to change to a very simple motif for the child to imitate – ascending pattern of notes.	The child imitates accurately.	Simple material is more manageable for the child to imitate.
12 seconds	I.4.B.1	I then alter the motif slightly.	The child is not able to imitate.	
22 seconds	P.4.A.1	I hold his hand to play the motif.	The child tolerates the input.	
20 seconds	I.4.C.1	I play half of the Rodeo motif and pause for the child to complete the rest.	The child starts to play random notes. It seems like he is playing La Cucaracha.	Perhaps the child is more interested in playing La Cucaracha.
7 seconds	I.4.B.1	I play the motif – la Cucaracha for the child to imitate.	The child imitates accurately.	It appears that the child is only able to remember this motif.

10 seconds	R.4.A.1	I play the remaining motif.	The child watches and smiles.	Here, it shows that the child recognises the motif.
24 seconds	I.4.A.1	The child starts to play random notes on the piano; I imitate in return.	The child starts smiling and looks at me. He then plays the material again.	Here, the evidence suggests that he recognises his sounds being imitated.
12 seconds	R.4.A.1	I play another motif for the child to listen.	The child observes.	The child is attending to sound.
1.04 minutes	R.4.A.1	The child requests for The Entertainer. Therefore, I play the piece for him.	The child watches and smiles.	It shows that the child likes the song.
19 seconds	P.4.A.1	I hold the child's hand to play the motif.	The child tolerates the input.	As the child likes the song, therefore, it motivates him to stay on task.
12 seconds	I.4.C.1	I cue the child to complete the motif.	The child completes the motif without support.	

9 5 seconds	I.4.B.1	I play La Cucaracha for the child to imitate.	The child imitates accurately.	The child has gained familiarity with the material and the task now.
46 seconds	R.4.A.1	I play La Cucaracha motifs for the child to listen.	The child listens attentively.	The child is attending to the motif I play.
12 seconds	I.4.C.1	I deliberately play incomplete motif for the child to continue.	The child completes the motif.	Here, the evidence suggests that the child is able to remember the material.
10 seconds	R.4.A.1	I play the rest of the motifs for the child to listen.	The child listens attentively.	The child is attending to the motif I play.
5 seconds	I.4.C.1	I play incomplete motif for the child to complete.	The child is unable to complete the motif.	Deficit in joint attention perhaps.
5 seconds	I.4.B.1	I play the motif again for the child to imitate.	The child imitates accurately.	Perhaps the child is unable to remember the motif and therefore requires me to demonstrate again.

12 seconds	R.4.A.1	I play the motif again.	The child is distracted by the broken key on the piano again.	The child is distracted by external stimuli.
9 seconds	R.4.A.1	I play Rodeo motif for the child to listen.	The child listens and observes this time.	The child is attending to the motif.
19 seconds	I.4.B.1	I break the motif into smaller chunks for him to imitate.	The child manages but not always on task.	The child appears to be distracted and is unable to focus on the task.
8 seconds	P.4.A.1	I hold the child's hand to play the motif.	He tolerates the input and manages to play without support later.	
9 seconds	I.4.C.2	I support the child to imitate the material accurately.	The child engages on task.	
34 seconds	R.4.A.1	I play The Entertainer motif for the child to listen.	The child smiles and observes.	The child shows recognition of the song. This seems to be his favourite song.

20 seconds	I.4.B.1	I play the motif for the child to imitate.	The child imitates accurately.	One can see that as the child likes the song, therefore, it motivates him to stay engaged on task.
13 seconds	P.4.A.1	I hold his hand to reinforce in learning the material.	The child tolerates the input.	
23 seconds	I.4.B.2	I support the child to imitate the motif.	The child engages on task throughout.	
20 seconds	I.4.B.1	When I take away support, only pause and wait for the child to imitate.	The child is unable to imitate the task.	Perhaps the child has yet to remember the material.
6 seconds	P.4.A.1	I hold the child's hand to play the motif.	The child tolerates the input and manages to play without support later.	The child starts to gain recognition of the material and can remember it.
9 seconds	I.4.B.1	I try again and play the motif for the child to imitate.	This time, the child can imitate accurately.	

8 seconds	P.4.A.1	I hold his hand again to reinforce in learning to play the material.	The child tolerates the input and manages to play without support later.	It seems that with kinaesthetic modality, it enhances the child's learning experience in assisting to remember the material better.
20 seconds	I.4.B.1	I play the motif for the child to imitate.	The child imitates accurately.	
1.02 minutes	R.4.A.1	I introduce new motifs to the child – Radetsky March and Carmen.	The child watches attentively.	The child is attending to the motifs I play.
10 54 seconds	R.4.A.1	I play motifs from La Cucaracha, The Entertainer. Linking two motifs together.	The child listens attentively.	The child is attending to the motifs I play.
14 seconds	P.4.A.1	I hold the child to play the motifs.	The child tolerates the input.	The child is focused on the task today.
1.28 minutes	I.4.B.2	I assist the child in imitating the materials with cues.	The child is able to imitate accurately.	

5 seconds	P.4.A.2	I then cue the child to play the motif.	The child plays the entire motif without any support.	The child has gain recognition of the motif now and can remember the material as well.
42 seconds	I.4.B.1	I play the motif several times for the child to imitate.	The child imitates accurately.	
1.58 minutes	I.4.B.2	I assist the child in imitating the materials with cues.	The child is able to stay engaged on the task.	It seems that the child is enjoying the task today.
36 seconds	R.4.A.1	I play The Entertainer motif for the child to listen.	He listens attentively.	The child is attending to the motif I play.
27 seconds	I.4.B.1	I then break them into smaller chunks for the child to imitate.	The child imitates accurately.	

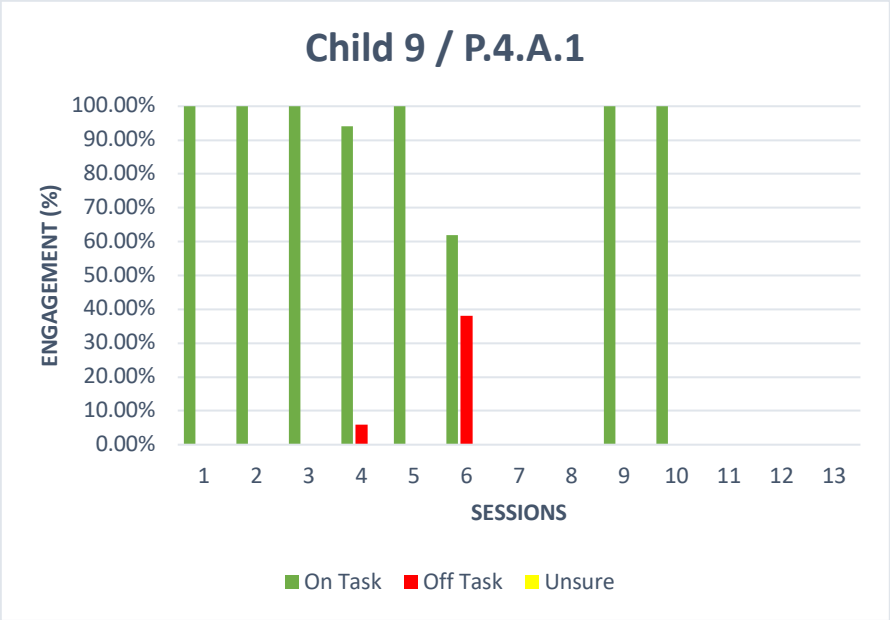


Figure 64. Engagement of Child 9 on Strategy P.4.A.1

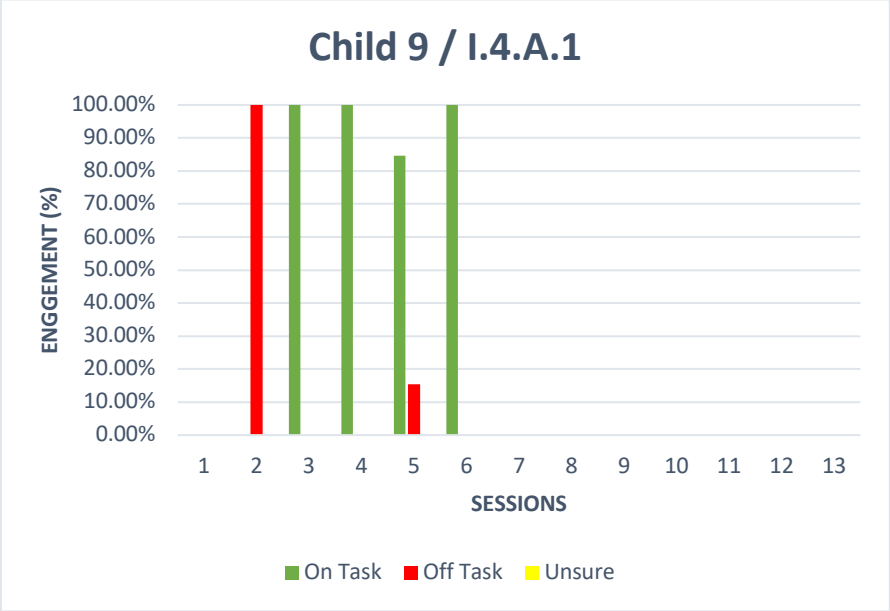


Figure 65. Engagement of Child 9 on Strategy I.4.A.1

Appendix 16 – Child 10

Child 10

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 20 seconds	R.4.A.1	I play motif from Three Little Birds for the child to listen.	The child seems to be listening attentively. He then starts to look away from the piano.	The child is attending to the motif I play but not consistently throughout the event.
1.19 minutes	P.4.A.1	I try to hold the child's hand to learn to play the motif. It is not always successful.	The child is able to tolerate the input for a short time, and then he pulls away from his hand. I have to repeat the task several times.	Perhaps the child is still unfamiliar with me. Therefore, he is reluctant for me to hold his hand to support him.
1.07 minutes	R.4.A.1	I play the motif again several times.	The child seems to be listening attentively.	The child is attending to the motif I play.
1.03 minutes	I.4.C.1	I then divide the motif into smaller sections and deliberately play half and pause for the child to complete the motif.	The child manages to complete one motif, and then he does not respond at all. When I prompt him by calling his name, he does not respond and just stares at the piano.	Perhaps the session and the instrument are new to him, and therefore he is still trying to make sense what is going on.

30 seconds	P.4.A.2	I decide to support the child to learn the material by cueing him to play on the notes.	The child is still staring at the piano and when I call his name, he says, 'No'.	The child appears to be reluctant to engage.
35 seconds	R.4.A.1	I then play another motif from the song BINGO.	No reactions are seen from the child.	The child is encountering the motif that I play but not attending to it.
56 seconds	P.4.A.1	I try to hold his hand to play.	The child refuses to let me hold his hand at all.	Perhaps the child is tactile defensive.
2.23 minutes	R.4.A.1	Since the child is reluctant to engage in any task, I decide to play different songs to stimulate him. These songs are provided by the class teacher; she says they are the child's favourite song.	The child is neither looking at the piano nor me. Halfway through the song, the child grabs my hand and prevents me from playing. He then starts to shake his hand and says, 'No!'.	I assume that the session is very new to the child and therefore he needs some time to settle in the session.
2 56 seconds	R.4.A.1	I start the session with She'll be Coming Round the Mountain.	The child seems to be interested and starts to sing along with me.	The child seems to feel more comfortable with the session now.
52 seconds	P.4.A.1	I hold the child's hand to support	The child tolerates the input for	Perhaps the child is trying to avoid the

		him to play the motif.	about 10 seconds; he then pulls his hand away.	sensation of touch.
21 seconds	R.4.A.1	I play If you Happy and You Know It for the child.	The child moves with the music.	The child is attending to the motif I play.
26 seconds	P.4.A.2	As the child is unable to tolerate the input, I decide to prompt the child to learn the motif.	The child refuses and starts to play random notes on the piano.	Perhaps the child is unable to comprehend what the task is about.
1.16 minutes	I.4.B.1	I play several short motifs and pause for the child to imitate.	The child is reluctant to engage and covers his ears with his hand throughout the event.	The teaching assistant says that the child has a very short attention span.
1.38 minutes	R.4.A.1	Since the child is reluctant to participate, I decide to play him a few songs in hope to motivate him.	The child grabs my hand and says 'No' and refuses to let go.	It appears that the child is not interested in the piano session.
3	I.4.C.1	I play incomplete motif deliberately and pause for the	The child starts to play random keys on the piano and reluctant to respond	It seems that the child is exploring the piano.

40 seconds		child to play.	to me.	
55 seconds	R.4.A.1	I start to play The Entertainer for the child to listen.	The child starts to feel distressed and moves around.	At this stage, I am trying to play as many songs as possible in hope to interest the child and hope that there will be one motif/song that the child may like.
52 seconds	P.4.A.1	I try to hold his hand to play. I try several times but unsuccessful.	The child refuses.	The child is feeling distressed, and this causes him to disengage from the session.
27 seconds	R.4.A.1	I play the song again.	The child is looking around, and he seems to be very distressed.	
39 seconds	P.4.A.1	I try to hold his hand again but unsuccessful.	The child refuses and keeps saying 'NO'.	
4 39 seconds	I.4.B.1	I play a short motif from La Cucaracha and pause to observe the child's reaction and in the hope that he will imitate.	The child is neither looking at me nor my playing. He is playing random keys on the piano.	Perhaps the child is still exploring the instrument and trying to figure out if he likes it.

39 seconds	P.4.A.2	I decide to cue the child to learn to play the motif.	The child continues to play random keys and does not respond to my instructions.	
32 seconds	R.4.A.1	I decide to play another song which is calmer – Prelude in C by Bach.	The child pushes my hand away and prevents me from playing.	I assume the child dislikes the piece that I am playing.
12 seconds	I.4.A.1	I imitate the child's playing.	The child starts to play random keys on the piano and pauses. When I imitate his playing, he shows no response and starts to feel distressed and starts to moan.	At this stage, I am still unable to understand why the child is behaving this way and what triggers him to feel so distressed in every lesson.
43 seconds	R.4.A.1	I play another motif in hope to elicit a response from the child.	The child starts to say No.	
8 seconds	I.4.A.1	I imitate the note played by the child.	The child plays a note on the piano. When I imitate, he looks away.	He has yet to develop awareness of own sound being imitated. However, at this stage, he is very distressed, and so it is unable to ascertain if his response

				is due to distress or he is unaware of his sound being imitated.
32 seconds	R.4.A.1	I try to continue to play other songs on the piano.	The child pushes my hand away and does not allow me to play on the piano.	The child seems to be very reluctant to participate.
5			The child comes in feeling very distress and keeps saying No to piano. He then wanders around the room and is reluctant to sit. When I try to play, he will push my hand away.	
1.06 minutes	R.4.A.1	I manage to get to play on the piano; I decide to play a motif from La Cucaracha.	The child pushes my hand away and covers his ears.	The child is unable to proceed with the session at all.
8 1.34 minutes	R.4.A.1	I start to play One Direction's song in hope to motivate the child.	The child starts to mumble and speak 'Oh dear', 'No'. He then grabs my hand and prevents me from playing.	For the whole session, the child is very distressed and keeps on preventing me from playing the piano. For 16 minutes, we are unable to do any activity as the child is very distressed

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9 47 seconds	R.4.A.1	From previous sessions, I know that the child will feel distressed every time he comes into the session. I notice it is the same for this session as well. Although the child stays in the room for more than 15 minutes, we are unable to conduct any activity due to the child is reluctant to engage and continuously try to prevent me from playing.	The child comes in again and says No.	The class teacher comes in and says that as the child is feeling exceedingly distressed whenever we have the piano session, it is unhealthy for the child's wellbeing. Therefore, she decides to withdraw the child from the study.

Appendix 17 – Child 11

Child 11

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 1.23 minute	No strategy	The child comes in feeling agitated and distress. He starts to press the keys individually and pushes me away. He then plays the keys using palms. It seems like the child is exploring the piano.		
17 seconds	R.4.A.1	I try to play on the piano.	The child is distracted by other objects; he starts to interrupt me with talking.	The child is unable to concentrate on the task. Perhaps I and the session are very new to him. The teaching assistant says that he has behavioural issues and it is challenging to get him to engage on task sometimes.
6.20 minutes		I try to play on the piano but constantly pushes away by the child. He wants to explore the piano on his own without others. He is reluctant for me to play on the piano.		
12 seconds	R.4.A.1	I try to play a short motif for the child.	The child watches and then starts to push me away.	The child attends to the motif I played but only for a short period.

43 seconds	R.4.A.1	I try to play the motif again.	However, the child starts playing with other objects in the room and interrupts me with talking.	As the session cannot be continued, I have to end the session and thinks of strategy to use in the next session.
2 15 seconds	R.4.A.1	I try to play a short motif for the child to listen.	The child is distracted by the objects around the room. There is a microphone used by the music teacher of the school, he spots the microphone and starts to play with it.	The child is still feeling unsettled and having some behavioural issues. Perhaps I and the session are still new to him. He needs time to settle down.
13 seconds	R.4.A.1	To attract his attention to the piano and to grab his interest, I demonstrate playing all the keys from bottom to the top (which he has been doing so since the first session).	The child stops and observes.	It seems like the child likes the sound from low to high. I tap into his interest to attract his attention.
19 seconds	I.4.B.1	I observe the child.	The child then imitates me to play the keys from the bottom to the top. However, very quickly his attention sways away and starts to press random keys with his palms.	It seems that the child likes the sound from low to high which triggers him to imitate me.
10 seconds	R.4.A.1	I then play descending pattern from top to bottom.	The child observes again.	Once again, the child is very interested in exploring all the keys of

				the piano. At this stage, as the instrument is very new to the child, the child is exploring the sound and the instrument.
11 seconds	I.4.B.1	I point to the keys and instructs the child to imitate again.	The child is reluctant to do so this time and starts playing random keys using his palms.	At this stage, I am assuming that the child is exploring the texture and the sound of the instrument.
8 seconds	I.4.A.1	I then imitate the child playing keys using palms and observes his reaction.	He shows no awareness of own sound being imitated. He starts to play random keys again on the piano.	The child does not recognise his sound is being imitated.
12 seconds	R.4.A.1	I play the black keys on the piano for the child to listen.	The child observes.	Perhaps the child starts to gain interest in what can be created or played on the piano.
14 seconds	I.4.B.1	I then instruct the child to imitate.	The child plays random keys again with his palm.	The child has yet to grasp the concept of imitation at this point it seems.
14 seconds	I.4.B.1	I try again and instruct the child to	The child imitates all the correct black	So perhaps it is due to delay in

		imitate the black keys.	keys accurately.	processing or the child's willingness to cooperate with me that affect his engagement on the task. As it seems that the child is able to imitate.
14 seconds	R.4.A.1	I then play descending patterns of black keys for the child.	It seems that the child recognises the pattern has now reversed as he starts to smile.	The child recognises that I reverse the materials I played. This is showed through his facial expression when he smiles while watching me play on the piano.
22 seconds	I.4.B.1	I then instruct the child to copy again.	The child starts playing random keys on the piano and when I try to hold his hand to support him, he pushes me away.	The child has yet to establish the trust to let me to hold his hand perhaps.
23 second	R.4.A.1	I decide to introduce a short motif (Rodeo) for the child to listen.	The child watches attentively and starts to imitate my gesture.	It seems that the child is very interested in what I am doing as he starts to imitate my gesture.
		The child then starts to play random keys on the piano. When I want to hold his hand to support him to play, he refuses and pushes me away.		

17 seconds	P.4.A.1	I decide to try again hold the child's hand to play the short motif. I communicate with him using short sentence such as 'Sam helps'.	The child tolerates the input this time and watches attentively.	Finally, the child allows me to hold his hand to support him to play the short motif.
15 seconds	R.4.A.1	The child cannot tolerate the input for long as he starts to pull his hand away. I then decide to play the short motif again for the child to listen.	He watches and listens attentively.	It seems that the child finally settles down and engages on the task given. Or perhaps the motif I played attracts his attention.
		The child then starts playing random keys on the piano again. I allow the child to explore and then I will say to the child 'Sam's turn'. The child will stop playing.		
26 seconds	R.4.A.1	I play another short motif for the child to listen (la cucaracha).	The child gets distracted and starts playing with the microphone again.	The child get distracted by external stimuli.
7 seconds	R.4.A.1	To get his attention back, I play the motif again.	The child's attention is drawn back to the piano; he watches attentively.	The child is attending to what I am playing.

8 seconds	P.4.A.1	I then hold the child's hand to play the short motif however it is not successful.	The child is constantly moving and tries to pull his hand away and starts talking.	The child is once again reluctant to let me hold his hand to play.
12 seconds	R.4.A.1	I then decide to play the motif for the child again to listen.	First, he watches attentively and then he starts moving around again and disrupts my playing.	The child is very active and constantly like to move around.
14 seconds	R.4.A.1	I then play all the black keys from bottom to the top.	The child watches and listens attentively.	Here, I tap into his interest to draw his attention back to the piano.
5 14 seconds	R.4.A.1	I start the session by playing Rodeo motif for the child to listen.	The child watches and listens attentively.	The child seems to be behaving more calmly today.
		The child then starts to press all the keys down again using his palms and does not allow me to play. I cannot stop him until I say, 'Sam's turn'. When the child hears it is my turn, he stops playing.		
6 seconds	R.4.A.1	I play the same motif again.	The child does not seem to be listening anymore, he wants to play on the piano.	The child is eager to explore the sounds on the piano on his own instead of listening to what I am

				playing.
22 seconds	R.4.A.1	I then found a solution in engaging the child. They will take turn in playing as the child constantly wants to play on the piano but will stop and let me play when I say, 'Sam's turn'. I use this strategy and play for Rodeo motif for the child several times.	The child does not seem to be listening at this stage.	Perhaps his excitement of wanting to play on the piano disrupts his listening concentration.
15 seconds	P.4.A.1	As the child shows enthusiasm in playing the piano. I decide to hold his hand to play the motif.	The child tolerates the input and watches attentively.	It seems that the child is getting used to me and allows me to hold his hand to learn to play the motif. Or perhaps it is the enthusiasm of learning that causes him to allow me to support him to learn the material.
9 seconds	P.4.A.1	I hold the child's hand to play the motif.	The child tolerates the input and watches attentively.	
10 seconds	R.4.A.1	When the child pulls his hand away, I continue to demonstrate the motif.	The child pushes my hand away and starts pressing random keys on the	It seems that the child is eager to play on the keys rather than listening to

			piano.	me.
14 seconds	R.4.A.1	As it is impossible for me to stop the child in playing, I use the same strategy again (turn-taking) so that the child allows me to demonstrate for him. I play Rodeo and La cucaracha motifs for him to listen.	The child allows me to play when I say, 'Sam's turn'.	By using turn-taking strategy, the child is able to tune in and engages on task and allows me to have my turn so that I can play the motifs for him to listen.
4 seconds	P.4.A.1	I then hold the child's hand to play the Rodeo motif.	The child tolerates the input and watches attentively.	Despite the child seems to be moving around and desires to explore the piano on his own, it seems that he starts to engage on the task that I introduced.
36 seconds	R.4.A.1	I continue to play Rodeo and La cucaracha motifs for the child to listen.	The child finally listens and watches attentively when it is my turn to play.	It seems that the child understands the turn-taking concept and that he watches and listens attentively when it is my turn.
7 seconds	P.4.A.1	I hold the child's hand to play Rodeo motif again.	The child tolerates the input.	The child is now able to engage on the task without much disruption.

23 seconds	I.4.B.1		The child then attempts to imitate the motif when I let go of his hand. Although not as accurate, it is a very good attempt.	Approximate imitation occurs here where the child tries to imitate my motif. With such a long motif, it will take several repetitions to learn and remember the motif.
5 seconds	P.4.A.1	When the child's attempt of imitation fails, I decide to hold his hand to support him to play the motif.	The child pushes my hand away.	It seems like the child wants to play the motif on his own.
8 seconds	R.4.A.1	As the child does not allow me to hold his hand, I decide to demonstrate the motif again for the child to listen.	The child watches attentively.	The child is attending to my playing.
9 seconds	P.4.A.1	I hold the child's hand again to play Rodeo motif.	The child tolerates the input.	It seems that when the child is willing to cooperate, he will only let me to hold his hand to play.
11 seconds	P.4.A.1	I try again to hold the child's hand.	The child pulls his hand away.	Once again, the child is reluctant to cooperate.

22 seconds	R.4.A.1	I decide to demonstrate the motif for the child but this time the other motif La cucaracha. I want to expose the child with a different variety of motifs.	The child watches and listens attentively.	The child is attending to the motifs that I am playing.
10 seconds	I.4.B.1		The child attempts to imitate me again but couldn't find the exact notes.	Approximate imitation occurs here.
		While I want to hold the child's hand to play, he starts pressing random keys again.		
11 seconds	R.4.A.1	I demonstrate the motif to the child again.	He watches attentively.	The child is drawn to the motif I played.
12 seconds	P.4.A.1	I hold the child's hand to play the motif.	The child tolerates the input.	It seems that the child's enthusiasm and motivation to learn to allow him to cooperate with me.
7 seconds	R.4.A.1	When the child let go of his hand, I demonstrate the motif again.	The child watches attentively and then start pressing random keys on the piano	The child attends to my playing and then starts exploring sounds again.

			again.	
10 seconds	I.4.A.1	I decide to imitate the child.	The child does not seem to be aware that his sound is being imitated.	The child has yet to develop his sound is being imitated.
22 seconds	R.4.A.1	I continue to play Rodeo motif for the child to listen.	The child watches and listens attentively.	The child attends to my playing.
10 seconds	P.4.A.1	I then hold the child's hand to play Rodeo.	The child tolerates the input.	The child allows me to hold his hand to support him in learning to play the motif.
11 seconds	R.4.A.1	When I let go of the child's hand, he starts playing random keys with his palms. I decide to demonstrate the Rodeo motif again.	The child stops and watches and listens attentively.	The child engages on the task.
14 seconds	I.4.C.2	As the child has played the motif for several times, I decide to change strategy, I deliberately play an incomplete motif and prompt the child	The child is able to complete the motif.	Here, it shows that the child is able to follow the cue however it is yet to know if the child remembers the material or he is just following my

		to completes the motif.		cue.
56 seconds	R.4.A.1	I then continue to play different motifs for the child to listen (La cucaracha, The Entertainer and Rodeo). I use turn-taking to help the child to stay on the task.	When it is my turn to play, the child watches and listens attentively.	Once again, it shows that with simple instruction, the child is able to stay on the task.
13 seconds	I.4.C.2	I then deliberately play incomplete motif (Rodeo) for the child to complete the rest.	The child is able to complete the incomplete the motif when I prompt..	It seems to me that the child is starting to remember the materials and able to stay focus on the task.
19 seconds	R.4.A.1	I play Rodeo and La cucaracha motifs for the child to listen.	The child watches and listens attentively.	The child attends to my playing.
9 seconds	P.4.A.1	I want to hold the child's hand to play Rodeo.	The child pushes my hand away.	The child does not seem to be ready for me to support him to play.
12 seconds	R.4.A.1	I play motif from Entertainer for the child to listen.	The child watches and listens attentively.	The child enjoys listening to my playing as it seems.

13 seconds	P.4.A.1	I hold the child's hand to play the Entertainer motif.	The child tolerates the input and watches.	The child engages on task.
11 seconds	R.4.A.1	When I let go of his hand, the child plays random keys again. The child plays Rodeo motif for him to listen.	The child seems to enjoy the motif and starts to vocalise (sings) the motif.	Here, it shows that the child likes the motif as he starts to sing/hum the motif that I am playing.
12 seconds	P.4.A.1	I then hold the child's hand to play the motif.	The child tolerates the input and watches.	The child engages on task.
53 seconds	I.4.A.1	I imitate the child's motif.	The child then suddenly starts creating a short motif of his own (D, E, F). The child recognises his motif being imitated and smiles and asks me to play.	The child is now aware that his own motif is being imitated. Perhaps this may due to it is not random keys that he spontaneously plays but it is a motif that he has created intentionally and therefore he is able to recognise when I copy him.
9 seconds	P.4.A.1	When the child stops playing his own motif, I hold his hand again to play Rodeo to reinforce his learning of the	The child tolerates the input.	It seems that the child is comfortable to play around the new instrument and that he feels comfortable for me to hold his hand as well to support his

		motif.		playing.
15 seconds	I.4.A.1	I imitate his motif.	When I let go of his hand, the child starts to play D, E, F again, his motif. The child is aware of his motif being imitated as he smiles at me.	Again, the child recognises I am imitating his own creation of motif.
8 seconds	R.4.A.1	When the child stops, I play Entertainer motif for the child to listen.	The child watches and listens attentively.	The child attends to my playing.
14 seconds	I.4.A.1	I imitate his playing.	The child plays D, E, F again.	The child recognises his motif being imitated as he smiles at me.
11 seconds	P.4.A.1	I want to show that motif can be created with regular changes, so I hold the child's hand to play D, E, F in different registers.	The child tolerates the input and watches attentively.	The child seems to be very interested in the tasks today.
7 seconds	I.4.B.1	I play the child's motif D, E, F and	The child imitates the motif in return.	Here, it shows that if the child likes

		pauses for the child to respond.		the activity or the motif, he is willing to engage on the task for an extended period.
24 seconds	R.4.A.1	I then continue to play different motifs for the child to listen.	The child listens and watches attentively.	The child attends to my playing.
13 seconds	P.4.A.1	I reinforce what they have learned today by holding the child's hand to play Rodeo motif again.	The child tolerates the input and watches attentively.	The child engages on task.
1.02 minute	R.4.A.1	The child starts pressing random keys on the piano again. I see it as a sign that the child is getting tired after long session. I then take turn in playing motifs with the child.	The child engages throughout and when it is my turn, he watches and listens attentively.	The child is able to stay on task on most of the task today. This shows that the child is able to focus if he puts his mind to it.
7 20 seconds	R.4.A.1	I play Rodeo motif on different registers.	The child watches attentively and smiles.	The facial expression of the child suggests that he recognises the motif.
11 seconds	P.4.A.1	I then hold the child's hand to play the motif. I then deliberately stop halfway	The child tolerates the input and watches attentively. He then completes	The child is able to complete the motif when I prompted which shows

	P.4.A.2	and prompt the child to complete the motif.	the motif when I prompted.	that he recognises the motif and remembers it.
10 seconds	I.4.C.1	I then deliberately play an incomplete phrase and prompt the child to complete the phrase.	The child is able to complete the phrase when prompted.	
8 seconds	P.4.A.1	I hold the child's hand to play Rodeo motif again to reinforce the learning.	The child tolerates the input.	The child stays engaged on task.
11 seconds	R.4.A.1	I demonstrate Rodeo motif for the child to listen.	The child listens and observes.	The child attends to the motif I played.
9 seconds	P.4.A.1	I hold the child's hand to play Rodeo motif.	The child tolerates the input and watches attentively.	The child stays engaged on task.
3 seconds	I.4.B.1		The child then starts to imitate my motif. He imitates accurately this time.	The child has improved in imitation as he is able to imitate accurately this time. This shows that scaffolding is vital at the initial stage of learning.

5 seconds	R.4.A.1	I play Rodeo motif to the child again.	The child watches and listens attentively.	The child attends to the motif I played.
23 seconds	I.4.C.1	I then deliberately play incomplete Rodeo motif for the child to complete. I repeat the task several times.	The child is able to complete the motif without prompting.	Here, it shows that the child is familiar with the motif now and that he can complete the motif without my support.
7 seconds	P.4.A.1 I.4.C.1	When the child stops completing the phrase, I support him to complete the child.	The child tolerates the input and is able to complete the motif.	
4 seconds	R.4.A.1	I play Rodeo motif for the child to listen again.	The child listens and watches attentively.	The child attends to the
24 seconds	I.4.B.1		The child attempts to imitate the whole Rodeo motif. He is not able to imitate the correct notes, but he tries to search and with several attempts, he finally able to imitate the whole motif.	The child puts in effort in searching to play the correct notes rather than imitate approximately — big improvement from the child.

20 seconds	R.4.A.1	I play the Rodeo motif again but here I adopt a strategy used in Level 2 SoI, the child rests his hand on my hand to feel the movement.	He watches attentively throughout.	The child seems to be attracted to the piano and is able to engage on the task throughout the session so far.
3 seconds	P.4.A.1	I hold the child's hand to play Rodeo motif.	The child tolerates the input.	The child engages on task.
30 seconds	I.4.B.1		The child imitates the whole motif again.	The child is very keen in imitating the whole motif during the session and he succeeds after several attempts.
8 seconds	R.4.A.1	I decide to change motif, plays La cucaracha for the child to listen.	The child watches and listens attentively.	The child attends to the motif I played.
15 seconds	P.4.A.1	I hold the child's hand to play La Cucaracha.	The child tolerates the input and watches attentively.	The child engages on task and at the end of the task, he is able to play the motif independently.
5 seconds	R.4.A.1	I play Entertainer motif for the child to	The child watches and listens	The child attends to the motif I

		listen.	attentively.	played.
8 seconds	P.4.A.1	I hold the child's hand to play Entertainer motif.	The child tolerates the input and watches attentively.	The child is very engaged on task today as he allows me to hold his hand all the time to help in playing the motif.
8 14 seconds	I.4.C.1	I start the session by deliberately plays incomplete Rodeo motif to the child to complete.	The child completes the motif without support.	Here, it is clear that the child recognises the motif and is able to complete the motif without any support.
42 seconds	I.4.B.1	I decide to play a short motif on pentatonic keys and pauses for the child to imitate.	The child imitates accurately.	The child's imitation skill has improved and is able to imitate accurately without my support.
9 seconds	I.4.C.1	I deliberately play incomplete Rodeo motif.	The child completes the motif without support.	Once again, the child is able to complete the motif independently without any support.
9 seconds	P.4.A.1	I hold the child's hand to play Rodeo	The child tolerates the input.	I want to support the child to be able to play the full motif without any

		motif.		support as at the moment, he is only able to complete the last part of the motif but not to play the full motif independently.
11 seconds	I.4.C.1	I deliberately play incomplete Rodeo motif for the child.	The child completes the motif again without support.	
32 seconds	R.4.A.1	I play La Cucaracha for the child to listen.	The child is not listening or watching at the piano. He starts to play random keys on the piano.	It seems that the child is not in the mood of 'attentive listening' today. He is keen to play on the piano.
22 seconds	I.4.B.1	I play the short motif on the pentatonic scale again for the child to imitate.	The child imitates accurately.	
16 seconds	P.4.A.1	I hold the child's hand to play Rodeo motif again.	The child tolerates the input.	The child engages on task. He seems keen to play on the piano.
18 seconds	I.4.C.1 P.4.A.1	I deliberately play incomplete Rodeo motif.	The child completes the motif with my help.	It seems that the child starts to lose concentration.

33 seconds	R.4.A.1	I play Radetsky March for the child to listen.	The child leans on the piano and does not seem to be listening.	The child is encountering the sound but not attending to it. It seems that he is not in the mood of listening today.
17 seconds	I.4.B.1	I play a short motif on the piano.	The child imitates accurately.	Once again, the child shows that he is able to imitate accurately without any support.
		The child then starts to move around and lies on my lap and refuses to play anymore.		
18 seconds	P.4.A.1	I hold the child's hand to play a short motif.	The child tolerates the input.	
30 seconds	I.4.A.1	I imitate the motif in return.	The child starts to play his D, E, F motif again on the piano. The child recognises I am imitating his motif by gesturing with his hand and nodding his head.	The child is aware that I am copying his motif.
7 seconds	I.4.B.1	I play a short motif.	The child imitates in return.	
12 seconds	I.4.C.1	I deliberately play incomplete Rodeo	The child completes the motif without	

		motif.	support.	

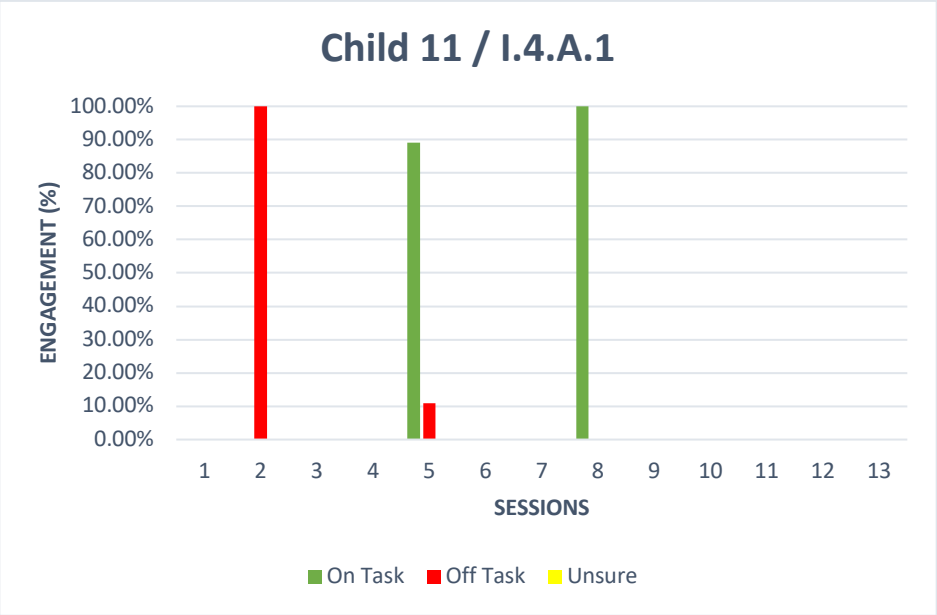


Figure 66. Engagement of Child 11 on Strategy I.4.A.1

Appendix 18 – Child 12

Child 12

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 56 seconds	R.5.A.1	I play Minuet in G.	The child listens attentively. When I ask if he wants to listen again, he puts his thumb up and says Yes!	The child is attending to the piece I play and expresses verbally he likes the piece.
1.55 minutes	P.5.A.2 P.5.A.4 I.5.B.1	I demonstrate short phrase of Minuet in G for the child to imitate bar by bar.	The child engages on the task throughout and looks attentively. He then tries to play on his own without any support. He successfully plays the first bar and takes turns with me and at the same time, I provide left-hand accompaniment as well.	The child possesses absolute pitch and this helps him to be able to imitate my material easily as he can hear the pitches in his head and matches them on the piano. I divide the phrases into smaller sections to help the child to remember the material.
1.54 minutes	P.5.A.2 P.5.A.4 I.5.B.1	I take turn with the child in playing Minuet in G.	At this stage, the child already knows the first bar of the materials very well. He is able to take turns and play together with me.	The child has excellent memory and he can remember some of the material after just listening and playing it several times.

54 seconds	P.5.D.1 P.5.A.2	I decide to switch to activity to play ascending pattern of notes up and down the octaves. I demonstrate for the child to imitate.	The child is able to imitate my playing, C-G all octaves. He is also able to play with a regular beat.	I introduce playing with proper techniques (5 fingers) and also introduce simple music theory – C major scale
41 seconds	R.5.A.1	I play Fur Elise to the child.	The child watches and listens attentively. Occasionally he moves with the music as well.	The child is attending to the piece I play and he shows fondness to it.
1.13 minutes	P.5.A.2	I then demonstrate the theme of Fur Elise for the child to imitate.	At first, the child finds it difficult to imitate the exact note however there are about 70% notes correct. The child keeps trying and I help him as well through several demonstrations until the child is able to imitate accurately.	This is a new piece for the child to learn and therefore perhaps he needs some time to remember the materials. It is amazing to see that the child's interest in learning the piece motivates him to stay on the task.
32 seconds	R.5.A.1	I introduce another song Ode to Joy to the child.	I ask the child if he would like to play Ode to Joy, he answers happily with a big smile on his face. He listens attentively and moves with the music.	Up until now, the child shows interest in all the pieces I have played so far and he is attending to all of them.

1.20 minutes	P.5.A.2	I demonstrate for the child to imitate.	The child imitates accurately and is able to play the whole song without support after two attempts.	The child picks up the tune very quickly. Perhaps this may be due to he has absolute pitch and his advanced memory skill.
53 seconds	I.5.A.1 I.5.B.1	I play simultaneously with the child sharing a common part and also at the same time provide left-hand accompaniment.	The child is able to perform the whole piece simultaneously with me without any support.	This is an advanced skill of performing as it implies hearing and concentrating on two parts at once. One must adjust his/her contribution to fit another's in real time.
		When I ask the child to play it again, he starts to play Fur Elise theme. However, he struggles to remember the exact notes.		
1.23 minutes	P.5.A.1 P.5.A.4	I provide physical support to help the child to play right notes.	The child then manages to play the theme of Fur Elise and takes turn with me.	I break the phrases down into smaller chunks for the child to learn and remember the material.
50 seconds	R.5.A.1	Once the child shows that he has enough of Fur Elise, I return to Ode to Joy and play the whole song for him to listen again.	The child watches and listens attentively.	The child is attending to the song I play.

52 seconds	I.5.A.1 I.5.B.1	I provide left-hand accompaniment and at the same time playing sharing a common part (melody) with the child as well.	The child manages to play the whole song without my support. He performs the whole song.	At this point, one is convinced that the child has mastered the piece and he is able to remember the material as well.
1.05 minutes	R.5.A.1	I obtain the child's favourite song from his music teacher. I play Lion King 'Can you Feel the Love Tonight?'	The child sits attentively and attends to the whole song and smiles and laughs when I play the song.	This suggests that the child recognises the song and he shows fondness to it.
1.04 minutes	P.5.A.2	I teach the child to play the piece through a demonstration for him to imitate.	The child immediately engages in the task and imitates accurately.	Using the song that the child likes, it helps him to learn the material easily as he already knows the song.
35 seconds	R.5.A.1	The child successfully learns the first bar of the song. I continue to play the rest of the song for the child.	The child watches and listens attentively throughout.	The child is attending to the song.
1.02 minutes	P.5.A.4 I.5.B.1	I complete the lesson by recapping the Minuet in G with turn-taking.	The child is able to remember the material without my support. He can perform simultaneously with me.	Within one session, the child can remember some materials from a new piece; it is a fantastic achievement.

2 36 seconds	R.5.B.1 R.5.A.1	I play Ode to Joy from the last session.	The child immediately recognises through smiling and listens attentively throughout.	The child is attending to the song I play and shows recognition of the song.
42 seconds	I.5.A.1	I then play together with the child sharing a common part.	The child is able to play the whole song together with me without support.	
1.01 minutes	I.5.B.1	I play the song again with the child but only provides left-hand accompaniment.	The child plays with me throughout the event.	The child has started to develop ensemble skill which he is able to play simultaneously with others maintaining independent part.
37 seconds	P.5.B.2 P.5.A.2	I decide to demonstrate how to transpose the melody to D major.	The child watches and listens attentively. When it is the child's turn, the child is able to play the whole song in D major.	I introduce a new musical concept – transposition.
1.07 minutes	P.5.D.1 P.5.A.1	I support the child to learn the left-hand accompaniment. At this instance, I simplify the left-hand accompaniment playing only simple bass line.	As the child is already familiar with the melody, I support him to play the left-hand accompaniment physically and moves his hand accordingly to the right note. The child finds it difficult to coordinate in playing both hands at the	As the child has shown mastery in playing the whole song, I proceed to introduce playing with both hands, to learn about coordination. As the child shows struggle in coordinating two hands, I simplify the left-hand

			same time, and therefore I modify the material.	accompaniment to simple long notes.
23 seconds	P.5.A.2	I then demonstrate to play hands together to the child so that he can imitate.	The child observes throughout. He is able to play with both hands with some help where I cue the child to play the correct notes on the left hand.	The child is always on the task which shows his enthusiasm for learning the piece.
1.05 minutes	P.5.D.1 P.5.A.2	I ask the child to do it again with both hands.	With some prompting, the child is now able to play the whole song with both hands.	
50 seconds	P.5.D.1 P.5.A.1	I ask the child to play both hands again.	I occasionally hold the child's left hand to support him in playing the accurate notes. He is engaged throughout the task.	I understand that it is through repetition of activities that one can master the skill/knowledge
28 seconds	R.5.A.1	I play Minuet in G from the previous lesson.	The child watches and listens attentively throughout.	The child is attending to the piece I play.
1.03 minutes	P.5.A.2	When I ask the child to play, he seems to have forgotten the	After the demonstration, the child is able to remember the material and takes	The child is able to express verbally what he wishes and when he struggles to

		materials and so he asks me 'How does it go?' in hope for me to demonstrate for him. I demonstrate the first phrase again to help in recapping the material for the child to copy.	turns with me.	remember the material, he asks for help as well. I understand that without the opportunity to practice, the child may forget the material as they only have one occasion to recap the material which is during the piano session.
40 seconds	P.5.A.2	Once the child has mastered the first bar of the piece, I expand the material to the second bar and join two materials together.	The child engages throughout and listens to my instructions and imitates the two materials. Halfway through the song, the child seems to be reluctant to play when I tell him it is his turn. Perhaps the material is getting difficult, or the child does not like the song. However, after I encourage the child to try, the child finally starts to play the materials again.	I suspect that the material is getting difficult for the child to remember and therefore he shows reluctance to continue. With some encouragement, the child eventually continues.
36 seconds	P.5.A.4	I take turns with him in completing the piece.	The child engages in the first 15 seconds and then reluctant to continue. The researcher has to move to another song.	Perhaps the child does not like the song. Preferentially he has some other pieces he wishes to play.
37 seconds	R.5.A.1	I start to play Can You Feel the Love Tonight.	The child immediately smiles when I play the song. He listens attentively to	It seems that the child is motivated by the song he likes.

			the song.	
20 seconds	P.5.A.2	When I stop, the child immediately plays the first phrase he learned from the previous lesson.	The child is able to play the first few phrases he learned from the previous session without my help.	
25 seconds	I.5.B.1	As the child knows how to play the melody by himself, I decide to provide left-hand accompaniment to perform with the child.	The child is able to maintain his independent part while I play the left-hand accompaniment.	The child shows amazing ensemble skill, and he is not bothered by the parts I play and can continuously maintain his part.
33 seconds	R.5.A.1	I play the remaining parts for the child to listen.	The child listens attentively and smiles throughout.	The child is attending to the song.
1.36 minutes	P.5.A.2	I then demonstrate the new section again for the child to copy and learn the material.	The child copies the material. Halfway through the song, the child seems to be reluctant to copy the material. I suspect that the material becomes difficult for the child to copy. The child seems to be distracted and starts to lose concentration.	Perhaps the materials are too complicated for the child to imitate and he struggles which puts him off in engaging on the task.

15 seconds	R.5.A.1	I play another song for the child to listen – If you happy and you know it.	The child recognised the song and smiles when he heard the song. When I ask him to if he wants to learn to play the piece, he reluctant to engage.	It seems that the child loses his concentration and wants to listen to songs rather than engaging in play the piano.
28 seconds	R.5.A.1	The child chooses Twinkle Twinkle Little Star. I play the song for him.	The child starts to move with the music and smiles. He listens attentively throughout, he then sings together as well.	The child shows fondness to the song, and he is familiar with it.
1.02 minutes	P.5.A.2	I ask him to play.	The child refuses to play but smiles and moves with the music when I play it again.	At this point, I assume that the child is tired and therefore reluctant to engage in play the piano.
25 seconds	I.5.A.1	After encouraging the child several times, the child finally plays the song together with me sharing a common part.	The child plays the whole song sharing a common part with me.	The child needs encouragement to participate in the task. Once he starts, he is able to play the complete song without any help.
41 seconds	P.5.D.1 P.5.A.2	I then recap C major that he learns from last session.	The child is able to play one octave ascending C major.	The child seems to remember the material with minimal cues.

18 seconds	P.5.D.1 P.5.A.1	I support the child to play with good fingerings.	The child tolerates the input, when asked to play by himself; first he is reluctant and then after a few seconds he engages by playing the whole scale but not with the correct fingering.	The child has yet to develop in playing with proper fingerings. I recognise that it is through many repetitions that the child may come to master the skill/technique.
38 seconds	P.5.D.1	When I ask the child to play it again, he refuses.	The child seems to be a little distracted today. He is unable to concentrate on his task.	It is unknown why the child is feeling a little distracted, perhaps he is feeling unwell, or he realises that he is not very interested in learning the piano.
22 seconds	I.5.B.1	I encourage the child to play again. I realise that perhaps it may be best to let the child learn the notes and the sounds of each scale before introducing playing with good fingering. She then provides left-hand harmony when the child plays the scale.	The child starts to play C major ascending without support.	Perhaps there is too much information for the child to process (playing the materials, remembering it and also playing with proper fingerings). I decide to focus on one thing at a time, for now, only learning the scale.
4.48 minutes	P.5.D.1 P.5.A.2 P.5.B.2	I introduce to transpose all the scales in different keys. D flat major, D major and E flat major.	The child engages throughout. I demonstrate and the child copies. When the child plays inaccurate notes, I provide cues to help the child.	When I take away in insisting on playing with proper fingers, the child is able to engage on the task.

	I.5.A.1			
3 15 seconds	R.5.A.1	I recap Ode to Joy.	The child watches and listens attentively.	The child is attending to the song I play.
41 seconds	I.5.B.1	I play together with the child providing left-hand accompaniment.	The child plays the whole song together with me without support.	At this point, I am sure that the child knows the song well and can remember the materials.
24 seconds	P.5.A.2 P.5.D.1	I demonstrate to play with both hands that he learns from the previous lesson.	The child is able to play both hands together throughout. Occasionally I provide cues when the child cannot remember the exact bass note.	The child continues in learning hands coordination.
32 seconds	P.5.D.1 P.5.A.1	I hold the child's right hand to play with good fingering. I sing the fingering for the child.	The child engages throughout and plays with proper fingerings. I only work on the right hand at the moment.	I break the task down, and instead of playing both hands while correcting his technique, I decide to focus on one hand before moving to next.
3.06 minutes	I.5.A.1 P.5.D.1	I ask the child to play with proper fingerings while I share a	The child is able to play with correct fingerings for the first line, and then he starts playing with his fingerings again.	As the technique is new, the child needs a constant reminder to maintain the good

	P.5.A.1	common part with him.	I stop and correct him. He then starts to play with good fingerings. He needs a constant reminder.	technique.
27 second	R.5.A.1	I play Minuet in G from previous lessons.	The child watches and listens attentively.	The child is attending to the song I play.
53 seconds	P.5.A.1	I support the child physically to play the correct notes.	The child seems to forget the materials, and so I support physically to help the child to remember the materials and play the right notes. However, the child does not like me to hold his hand for long, and therefore I change strategy.	Children with ASC sometimes exhibit hypersensitivity to the sensation of touch.
21 seconds	P.5.A.2	I demonstrate the materials.	The child imitates.	The child learns better when the strategy matches his learning needs.
34 seconds	P.5.A.1	I support the child physically again as the child is struggling.	The child tolerates the input and allows me to help him.	
1.14 minutes	P.5.A.2	I demonstrate the material again.	The child struggles to imitate. It seems that the child starts to lose	It is unable to ascertain at this instance if the child is losing concentration thus

	P.5.A.1		concentration.	contribute to the disengagement of the task or the material is too difficult for the child to imitate.
47 seconds	P.5.A.1 P.5.A.2	I want to try again and encourage the child to play.	The child is able to play the whole phrase with my support occasionally.	The child is starting to conquer the materials.
21 seconds	R.5.A.1	I play the material again and demonstrate to the child that the phrase has to be played twice.	The child watches and listens attentively.	The child is attending to the song.
45 seconds	P.5.A.1	I request the child to play.	The child plays the phrase with my support occasionally.	
14 seconds	R.5.A.1	Once the child has completed his phrase, I play the remaining bars for the child to listen.	The child listens attentively.	The child is attending to the song.
17 seconds	P.5.D.1 P.5.A.2	I recap C major scale from previous lesson.	The child remembers how to play C major scale but not the proper fingerings.	As discussed above, the child has yet to master the technique in playing with proper fingerings.

1.21 minutes	P.5.D.1 P.5.A.1	I support the child to play C major scale with good fingerings.	The child is having difficulty to play with good fingerings. The child tolerates the input and when I ask the child to play on his own. He can play with 90% accuracy.	The child is slowly developing the proper technique in playing the scale.
17 seconds	P.5.D.1 P.5.A.2	I continue to demonstrate with good fingerings again.	The child loses concentration and starts to play his materials on the piano — descending pattern of notes. It seems like he is improvising.	It is not known precisely what the child is doing, but it seems like he is improvising and creating his materials.
57 seconds	I.5.B.1	I decide to join in with the child by providing left-hand accompaniment.	The child starts to play ascending and descending pattern of C major scale but rhythmically.	I do not want to stop the child as it seems like he is doing something creative and he is playing the materials musically.
28 seconds	No strategy		The child suddenly plays Minuet in G by himself without my help.	
45 seconds	P.5.A.1	I decide to support the child to play with good fingers.	The child tolerates the input and engages throughout.	

12 seconds	R.5.A.1	I introduce a new song to the child, Stevie Wonder.	The child listens attentively throughout. However, when I ask if he likes the song, he expresses verbally no.	The child is able to communicate verbally what he likes and what he dislikes.
1.36 minutes	R.5.A.1	The child chooses another song – Radetsky March.	The child listens attentively but then halfway through starts playing with the pedals.	The child appears to be losing concentration.
2.05 minutes	R.5.A.1	I introduce Prelude in C by Bach to play with the pedals.	The child expresses he likes the song.	My aim is to provide a wide range of repertoire for the child to listen. I particularly choose pieces that are repetitive.
5 1.25 minutes	P.5.D.1 P.5.A.1	I start with Ode to Joy. I support the child to play with both hands	The child plays both hands with my help occasionally with the left-hand accompaniment.	The child tolerates the input and engages on the task throughout. It seems that the child has gained familiarity in playing the piece.
38 seconds	R.5.A.1	I play the whole song for the child to listen.	The child listens attentively throughout.	The child is attending to the song.
1.38 minutes	P.5.D.1	I ask the child to play both hands	The child struggles mainly on the third	The child has yet to master in playing

	P.5.A.1	again.	line. I provide physical support to him.	both hands therefore by providing appropriate support; one can help to foster the child's musical skill.
1.42 minutes	R.5.A.1 P.5.B.2	I introduce transposition of Twinkle Twinkle Little Star into various keys.	The child listens attentively when I transpose to another key; he observes.	I introduce transposition again to reinforce in learning the musical concept.
6.14 minutes	I.5.B.1 P.5.B.2	I encourage the child to try after watching the demonstration. I provide left-hand accompaniment and perform together with the child.	The child is able to transpose the song into D flat major, D major, E flat, E major, F major, F sharp major with minimal support. When I want to continue to G major, the child politely refuses and says that is enough, so I stop.	I notice the child starts to recognise patterns, perhaps the child's absolute pitch helps him in getting the notes correct as well.
2.13 minutes	R.5.A.1	I play Prelude in C for the child again from the previous lesson.	The child listens attentively throughout.	The child is attending to the piece.
40 seconds	P.5.A.1 P.5.A.2	I support the child to learn the first bar.	The child tolerates the input and plays the 2nd time accurately after support.	

1.38 minutes	P.5.D.1 P.5.A.1 P.5.A.2	I support the child to learn the materials again with proper fingerings.	The child tolerates the input and imitates.	It seems like the child is keen to learn the new piece.
56 seconds	P.5.A.2	As the child pulls his hand away from me, I decide to change strategy and demonstrate the materials to the child.	The child imitates the piece.	
1.36 minutes	P.5.D.1 P.5.A.1	I support the child to play C major scale again.	The child tolerates the input.	I am hoping the child is able to learn to play with proper technique.
6 1.40 minutes	P.5.D.1 P.5.A.1	I help the child to play Ode to Joy both hands.	The child plays Ode to Joy both hands by himself, occasionally with my support. The child is able to play first and second line with both hands but not the third line.	The third line proves to be difficult for the child to master. It is understandable as line one and two use repeating materials.
43 seconds	R.5.A.1	I play the whole song for the child.	The child first listens, and then he seems to lose concentration and moves around looking through my music books and starts playing with pedals as well.	At this point, I assume the child is bored with the song already.

1.07 minutes	R.5.A.1 P.5.B.1	I play Twinkle Twinkle Little Star for the child again and then improvise on the materials.	The child observes throughout. When I play the improvised version, the child watches closely at what I am doing.	The child seems to be very interested when I start to improvise the materials.
21 seconds			When I stop, the child starts to improvise by himself. As it is utterly new to him, so he is struggling to get the melody right, I assist the child by demonstrating to him so he can imitate.	
5.33 minutes	P.5.B.1 I.5.B.1	I demonstrate the improvised material for the child to copy.	The child imitates. The child learns the whole improvised Twinkle Twinkle Little Star. After 5 minutes, the child is able to play the whole improvised version on his own with minimal support.	This is the first time I introduce improvisation, a new musical concept. Instead of allowing the child to improvise on the materials, I demonstrate how to improvise, and the child imitates first. This will then perhaps lead to the child improvising his materials.
52 seconds	P.5.B.1	I ask the child to play it again.	The child starts to play the first half of the song and then stops and refuses to continue.	Perhaps the activity and the material are new to him, and he is trying to make sense what is happening.

22 seconds	R.5.A.1	I play the remaining part of the song.	The child seems to lose interest and concentration. He looks away from the piano.	The child is encountering the sound but not attending to it.
36 seconds	P.5.B.1	I try again and encourage the child to play again.	First, the child does not want to play but then after the encouragement, he finally starts to play the piece. However, he only completes the first half of the song and then stops.	Perhaps the remaining materials are too complicated for the child to play and that contribute to his disengagement.
2 minutes	R.5.A.1	I start to play Prelude in C for the child from the previous lesson.	One can see that the child likes the song as he starts to smile and laughs throughout showing recognition of the piece.	The child is attending to the piece. He seems to like the piece as well.
1.34 minutes	P.5.A.1	I support the child to play the first bar by holding his hand.	The child tolerates the input and manages to play the first bar twice, and then he starts to play on random keys. However, it seems like he is improvising on the material from Prelude in C.	It is unsure at this point what is he playing. When he stops, I encourage him to continue, and I copy his material. However, he is reluctant to continue again.
6 minutes	R.5.A.1	I play Prelude in C again for the	The child is moving around and does	The child is losing his concentration.

		child.	not seem to be engaging.	
1.18 minutes	P.5.A.1 P.5.A.2	When I request the child to play again or improvise. The child is reluctant to do anything at all.		
1.16 minutes	R.5.A.1	I decide to play a new repertoire for the child – Sonata in A.	The child smiles and laughs when I play and he observes as well. When I ask if he likes it, he does not answer but when I play again he starts laughing and smiling.	The child shows fondness through smiling and laughing throughout
25 seconds	P.5.A.2	I demonstrate the first bar of the material for the child to copy.	The child copies. When I decide to continue, the child starts to improvise on his own.	
1.38 minutes	I.5.C.1	Based on the material given of the new repertoire, the child starts to improvise on it. I decide to join in and provide left-hand accompaniment and improvised together with the child.	The child seems to enjoy the activity.	This is not the first time the child improvises; it is impressive how the child processes the materials he heard and then transforms into his material.

19 seconds	R.5.A.1	I play the material again for the child to listen.	The child listens.	The child is attending to the piece.
25 seconds	P.5.A.2	When I ask him to imitate the material, the child starts to improvise on his own again.	It seems that the child does not want to learn the material but wants to play something of his own.	The child seems to be in the mood of improvising rather than learning the actual material.
54 seconds	I.5.C.1	I join in to improvise together with the child however I can see that the child seems to lose interest and concentration already.	The child improvises on the material I provided.	Since the child is interested in improvising, I decide to join in together with the child.
7 1.13 minutes	R.5.A.1	I allow the child to choose which pieces and songs that he wants to listen. The child chooses Hakuna Matata.	The child listens attentively throughout, when I play the chorus, he starts laughing and moves together with the music showing recognition of the song.	The child likes all the songs from the movie Lion King. Here, one can see the happiness when he encounters the song.
1.24 minutes	R.5.B.1	I play the song again.	The child starts to express verbally he is excited. He starts to sing together while I am playing.	

3.04 minutes	P.5.A.2 P.5.A.1	I then demonstrate the material phrase by phrase for the child to copy.	The child shows interest in learning when he copies every single phrase and smiles at the same time while playing.	This shows that if the child is interested in the song, he is more willing to learn.
25 seconds	R.5.B.1	I play the chorus for the child again to listen.	The child laughs and sings together with me.	The child shows fondness to the song and is attending to the song.
31 seconds	P.5.A.2 P.5.A.1	I continue to help the child to learn the song through imitation. As the child knows the song, I sing at the same time as well to help the child to learn the material.	When he manages to play the whole phrase, he laughs happily showing sign of accomplishment.	The child's interest in the song motivated him to learn the materials and stays on the task throughout the event.
30 seconds	I.5.B.1	I ask the child to do it again. She then provides left-hand accompaniment for the child.	The child is very excited and laughs throughout. He plays all the materials accurately without my support.	
31 seconds	R.5.A.1	I play the remaining part of the song.	The child laughs and sings and dances to the song.	The child is attending to the song and he likes the song.

1.33 minutes	R.5.B.1	I play The Entertainer, a song that the child has listened before in his music class.	When I play, he immediately shows fondness by smiling throughout and moves with the music. He also laughs in between and asks me to do it again!	One can see that the child is able to express verbally the song that he likes.
1.32 minutes	R.5.B.1	Upon the child's request, I play the song again.	The child listens and laughs.	One can see that the child likes the song as he is laughing throughout.
1.57 minutes	P.5.A.2 P.5.A.1	I support the child to learn to play the song through imitation and by holding his hand sometimes to correct the notes.	The child imitates and tolerates the input for me to help him.	The child engages in the task throughout.
32 seconds	R.5.B.1	I play the song for the child to listen again.	The child listens attentively and watches.	The child is attending to the song.
2.16 minutes	P.5.A.2	I support the child to learn the material again.	The child imitates the phrase. It seems that the material may be slightly challenging for the child to learn but it seems like he is willing to play.	The child struggles to get the material right. Perhaps this is because the material is slightly more difficult than the other pieces that he has been learning. However, one can see that as the child likes the song, he is able to stay on the task.

1.29 minutes	P.5.D.1 P.5.A.1	I recap Ode to Joy again from the previous lesson. I support the child to play with both hands.	The child remembers the materials especially the first two lines without support. The child has improved on playing 3rd line as well.	One can see that by providing appropriate support and through many repetitions, the child starts to show improvement.
1.56 minutes	R.5.B.1	I recap Twinkle Twinkle Little Star and transpose to various keys.	The child listens and observes. Halfway through the transposition, the child starts to play on random keys. It seems random but it may be that the child is trying to improvise together with me.	It is unknown what the child is playing. Perhaps he is losing concentration as well.
3.18 minutes	P.5.B.2 I.5.B.1	I ask the child to transpose the song.	The child transposes the song into D flat major and D major.	The child seems to start to understand the concept of transposition.
8 27 seconds	P.5.D.1	I use a picture to teach proper posture to the child.	The child follows the picture and sits straight in front of the piano.	Using the picture, it helps the child to visualise how to sit with proper posture.
1.33 minutes	P.5.D.1 P.5.A.1	I recap Ode to Joy that the child learned previously.	The child plays Ode to Joy with both hands with some support as he seems to have forgotten the left-hand accompaniment.	

32 seconds	I.5.A.1	Once the child starts to remember the material, I play together with the child sharing a common part.	The child plays together with me.	The child enjoys playing with me as he engages on the task throughout. It may also because he knows the material well enough to stay on the task.
1 minute	I.5.A.1	I want to provide space for the child and decide to play on another piano together with the child.	Without the researcher sitting next to him, the child is able to play the whole song by himself.	
1.32 minutes	R.5.A.1	I allow the child to choose what song he wants to listen. He chooses Hakuna Matata.	The child starts to smile when I play the song. He then starts to sing together.	The child is able to express verbally what he wants. It is essential to allow the child to choose as it motivates him to learn the song that he likes.
2.58 minutes	P.5.A.2	I teach the child to learn to play the song through imitation. I am also singing at the same time so the child can internalise the song in his head before playing it out.	The child imitates and learns the whole chorus.	As the child likes the song, he is willing to repeat the song as many time as the researcher asked him to.

1.07 minutes	I.5.B.1	When the child has mastered the material, the researcher played together with the child providing left-hand accompaniment.	The child plays the whole chorus together with me.	The child seems to like the song very much as he smiles throughout. He is also able to stay on the task throughout the event.
1.55 minutes	R.5.A.1	I allow the child to choose another song to listen. He chooses Prelude in C.	The child recognises the song. This is shown through his facial expression which he smiles when I start playing. He then listens and observes.	The child is attending to the piece.
1.56 minutes	R.5.B.1	I play The Entertainer that the child shows preference from the previous lesson.	The child immediately laughs and smiles. When I ask if he wants this song, he says, 'yes'. He then moves with the music and laughs throughout when I play.	The child shows recognition to the song and the prominent features of the song as well.
26 seconds	R.5.A.1	I introduce a new song to the child – The Drunken Sailor.	The child seems to enjoy the song as he smiles and moves with the music. He then requests me to play it again but with fast tempo this time.	The child is capable of expressing his likes and dislikes verbally. Here, I agree with his demand as I want him to listen to different tempo, dynamics and articulations can be achieved in a piece.
24 seconds	R.5.B.1	I play The Drunken Sailor again	The child listens attentively and smiles.	The child is attending to the song.

		but with fast tempo this time.		
58 seconds	R.5.B.1	I then recap Sonata in A. The researcher asks if the child remembers the song.	The child recognises and says yes but then halfway through the song, he starts to yawn. I notice that he is quite tired already.	The child has a long session and he is losing his concentration.
2.56 minutes	R.5.A.1	The child then requests me to play What Makes You Beautiful by One Direction.	The child seems to enjoy the song very much as he requests to play it three times. He then laughs and sings together with me.	The child seems to have a broad interest in a range of repertoire.
11 29 seconds	P.5.D.1	I show the picture of good posture to remind the child to sit straight.	The child follows the instruction and sits straight.	The picture serves as a reminder to the child and it helps the child to visualise the posture as well.
1.12 minutes	R.5.B.1	I play Hakuna Matata for the child to listen.	The child listens attentively.	The child is attending to the song.
1.05 minutes	P.5.A.1	I support the child to play Hakuna Matata. The child can remember 85% of the materials	The child is able to play the whole song with minimal support. He can remember 85-90% of the materials by	The child has yet to develop with playing proper technique. This is the

		without my support, but I want the child to play with good fingerings.	himself.	next aim we need to achieve.
1.11 minutes	P.5.D.1 P.5.A.1	I work on the child's technique to achieve playing with good fingering.	At first, the child seems uninterested and disengages on the task. Although I am holding his hand in pressing down the keys, he is looking at somewhere else. Halfway through, he starts to play with the fingerings that I introduced.	It seems that playing with proper technique is a challenge for the child.
1.57 minutes	P.5.D.1 P.5.A.1	I transfer the fingering work onto Hakuna Matata to support the child to play with good fingering.	It is a challenge for the child to play with five fingers constantly but he is able to tolerate my help.	
1.29 minutes	R.5.A.1	I introduce a new song to the child – Burgmuller.	The child seems to enjoy the song; he smiles when I play and then starts to move with the music.	The child is attending to the piece.
48 seconds	R.5.A.1	The child chooses another song – Prelude in C minor by Bach.		

20 seconds	R.5.B.1	I play Prelude in C minor to the child.	The child does not seem to like the song, and he starts to yawn. I ask if it is Prelude in C the child wants. I play to the child, and the child says yes.	The child looks tired, and he does not seem to be engaging on the task today.
1.47 minutes	R.5.B.1	I play Prelude in C to the child.	The child listens attentively.	
12 seconds	R.5.B.1	I then play Ode to Joy to the child and ask if he is okay with the song.	The child says yes.	
1.34 minutes	P.5.D.1 P.5.A.1	I ask the child to play Ode to Joy with both hands.	The child plays the whole song with two hands occasionally with my support.	
36 seconds	P.5.D.4 P.5.D.5	I support the child to play with good technique, five finger exercise again — this time I introduce minor scales.	The child plays minor scales but is unable to play consistently with good fingering.	The child struggles consistently with playing with proper technique.
13 1.28 minutes	P.5.A.2 P.5.A.1	I support the child to play Prelude in C.	The child tolerates the input.	I combine strategies to help the child in learning the piece.

2.15 minutes	R.5.B.1	I play the whole Prelude in C to the child.	The child listens and observes.	The child recognises the piece and is attends to the piece I play.
4.54 minutes	P.5.A.2 P.5.A.1	I support the child to play Prelude in C.	The child learns through cues and imitation.	
49 seconds	R.5.A.1	I introduce a new piece for the child – Beethoven Sonatina in G.	The child listens and observes. When I ask if the child likes the piece, the child does not show any reaction at all.	Perhaps the child is not interested in the piece.
35 seconds	R.5.B.1	I decide to play The Entertainer.	The child immediately smiles when I play the song. It seems like the child does not feel like playing in today's session and so I allow the child to choose different songs to listen.	This is to broaden his listening experience. Moreover, since the child is reluctant to participate in playing, I take this opportunity to play various pieces and songs for him to listen.
31 seconds	R.5.A.1	The child chooses The Wedding March.	Generally if the child does not like the song, he will choose to change the song. The child listens the whole song attentively.	The child is attending to the piece.

1.52 minutes	R.5.A.1	The child chooses another song after – Air on G String	He seems to be listening however halfway through the song he starts to lose his concentration and looks somewhere else.	The child does not show much interest in this song.
2.51 minutes	R.5.A.1	I choose another piece to play for the child – Claire de La Lune	It seems that the child loses interest halfway through the piece and starts to play something random on the piano while I am playing.	
1.29 minutes	R.5.A.1	The child chooses another song but at this stage, the child is not listening at all. I decide to stop the lesson.		

Appendix 19 – Child 13

Child 13

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
1 1.35 minutes	P.5.A.2 P.5.A.4	I play Minuet in G for the child to listen. I then prompt the child to complete a short phrase and takes turn with me.	The child engages throughout the task and is able to play the material on his own without my prompt from the third time.	At this stage, I am only focusing on learning the materials not the techniques. Here, I break the piece into small parts and support the child to learn them gradually.
38 seconds	R.5.A.1	I play Fur Elise for the child to listen.	The child listens attentively and smiles.	It seems that the child is enjoying the piece and that he likes what he is hearing.
2.28 minutes	P.5.A.1 P.5.A.2	I first demonstrate the materials. I hold the child's hand to play the materials. I then prompt the child to play on the correct keys when I let go of his hand.	The child immediately tries to imitate however when he is unsuccessful in getting the materials accurately, he grabs my hand to show him. After several times, the child is able to play the first section without prompting or support.	The child is very keen in learning. Although there were times that his concentration loses, but very quickly he is drawn back to the task.
1.02 minutes	P.5.A.2	I continue to work on Fur Elise,	The child tries to imitate immediately	It seems that the child is enjoying the

	P.5.A.4	expanding the material to two short phrases. As the child is close to playing accurate notes, I prompt the child and takes turn with him.	however was not successful. The child responds to the prompts and plays accurately.	task very much and he is very much on the task most of the time. The child shows musical potential when he successfully learning the two phrases and able to play them without any support after.
2.11 minutes	P.5.A.2 P.5.A.4	As the child is a fast learner and he seems to be enjoying the task very much, I expand the material to three short phrases.	The child responds to the prompts and takes turn with me. However, it seems that the material is too long for the child, he struggles to stay on task and constantly repeating the first and second phrase and couldn't remember the third phrase.	I notice that three phrases might be too long for the child to remember at this stage given that this is his very first session. It is understandable that the child starts to lose concentration as he cannot remember the material especially the third phrase.
48 seconds			The child decides to try on his own without my help on all three materials and he successfully combines three phrases and plays accurately without my help.	The child's determination shows that his interest in music motivates him to learn the materials and to be able to play the materials without my help.
57 seconds	R.5.A.1 P.5.A.4	I decide to revise the first piece they have learned (Minuet in G) to see if the child remembers.	The child remembers the material and immediately shows recognition through his facial expression and starts to take turn with me.	The child shows amazing memory, he can remember all the materials he has learned in the session.

2.02 minutes	P.5.D.1	I introduce five-finger exercise on C.	The child tolerates me holding his hand to play at first. He is then able to play C, D, E, F, G from the bottom range of the piano to the top without my support. However, the child gets distracted by the broken key and cannot continue.	The child gets distracted by external stimuli.
47 seconds	P.5.A.4	I decide to take turns with him to recap the piece.	The child starts to play Minuet in G.	The child's interest on the piano motivates him to start to play the piece even without me asking him to. He is also able to remember the materials.
2 37 seconds	R.5.A.1	I start the session by playing Fur Elise to recap the piece from the previous session.	The child smiles when I play the piece.	Here, the child shows recognition of the piece from his facial expression. He is eager to start playing when I stop.
30 seconds	P.5.A.4	I take turns with the child in playing the piece.	The child is able to play without my support and although he forgets the 2nd and 3rd material, he is able to remember the first material accurately and takes turn with me.	The child shows advanced memory as he is able to remember the material when he does not have the opportunity to practice the piece. I did not stop the child when he is unable to play 2nd and 3rd material as I am aware that it will take time for the child to learn and remember the long materials. I carry

				on and let the child play what he is comfortable with.
42 seconds	P.5.A.2	I then continue to show the child 2nd and 3rd material to recall his memory.	The child watches and imitates in return.	At the end of this event, the child is able to play the materials accurately without my support. The child is very focused during the session, this may due to his interest in playing the instrument that motivates him.
2.38 minutes	P.5.A.2	I carry on showing him the new material of the piece (last phrase) we are going to learn.	The child has difficulty in remembering the material although he tries several times.	It seems that there is information processing difficulty here where the child cannot proceed when he makes errors. He will constantly repeat the first three materials although I keep introducing the new material to him.
1.25 minutes	P.5.A.1	Guided by the child, I demonstrate the materials slowly so that he can process and memorise the information.	The child then grabs my hand to indicate her to demonstrate the materials again slowly. The child sings along while I am playing.	One can see that the child's interest in learning the piece motivates him to proactively interact with me (grab my hand for demonstration). Moreover, his determination to learn the piece is showed throughout. As after two attempts, he is able to play the complete material accurately without

				my support.
2.23 minutes	No strategy		The child starts to play the complete piece without my support.	It is not 100% accurate at this stage however he is trying hard to remember all the materials. Here, I notice that he tends to stop and start from the beginning every time he makes a mistake. After several attempts, the child is able to play the complete piece accurately.
12 seconds	R.5.A.1	When the child successfully plays the complete Fur Elise, I then decide to introduce a new piece for him (Ode to Joy).	The child listens at first and then he starts to interrupt and keeps saying 'It's a new song! It's a new song!'	The child shows excitement that I am introducing a new song for him.
2.33 minutes	P.5.A.2	I demonstrate the first line of Ode to Joy for the child to learn.	The child watches attentively and tries to imitate however not very successful.	The materials are new to the child and therefore it may take some time for the child to process and absorb.
1.01 minute	P.5.A.2	I continue to demonstrate the second line of Ode to Joy for the child to imitate.	The child attempts to play the material however it is not successful, and he loses his concentration and starts	Perhaps the child is experiencing delay in processing where he is still processing the materials from Fur

			playing Fur Elise.	Elise.
38 seconds	No strategy		The child starts to play Fur Elise again, accurately without my support.	Here it shows that the child is processing the piece of Fur Elise and he decides to play the whole piece out.
47 seconds	No strategy		After playing Fur Elise, the child starts to play Ode to Joy. Surprisingly he is able to play the first two line of Ode to Joy accurately without my support.	Although the child is not successful in imitating the materials while I am demonstrating, it shows that perhaps the child is internalising the materials since he is able to play accurately without my support after.
2 minutes	P.5.A.2 P.5.A.4	I then continue to demonstrate the third line of Ode to Joy.	The child watches and imitates in return and repeats this several times. He takes turn with me in learning the materials.	After repeating several times (seven), the child is able to play the third line accurately. Perhaps the materials can be broken down into smaller chunks for the child to remember.
21 seconds	P.5.A.2 P.5.A.4	Once the child has mastered the third line of Ode to Joy, I continue to demonstrate the last line of the piece.	The child watches and imitates in return.	The child is able to imitate and play the line accurately. Pieces with repetitive materials are a good starting point for the child to learn to play a complete piece as repetitive materials are easy

				for them to remember.
37 seconds	R.5.A.1	I then play the complete piece for the child to listen.	The child watches attentively while I play.	The child shows fondness of the piece through his facial expression when he smiles while I was playing the piece.
1.53 minutes	P.5.A.2	I then cue the child to play the full piece of Ode to Joy.	The child struggles to put the complete piece together. Although I provide cues to help him, he starts to lose his concentration and play Fur Elise again. He manages to play the complete piece of Fur Elise. Once he has done that, he attempts to play Ode to Joy again. For the second time, the child manages to play complete Ode to Joy successfully.	One can see that the child is experiencing difficulty in information processing. Ode to Joy is a new piece for him and he requires more time to process the information and while he fails, he takes a step back in playing the piece that he is confident and comfortable with before giving another attempt on the new piece. Here it shows the child is dedicated and motivated as he does not give up when he struggles to remember the piece.
46 seconds	P.5.D.1 P.5.A.2	I introduce C major and D flat major scales.	The child watches and imitates in return. However, after playing D flat major, the child suddenly starts to play Fur Elise again.	It seems that the child enjoys playing Fur Elise and so I decide to join the child by providing the left-hand accompaniment for the first time and observe where this will lead.

1.15 minutes	I.5.A.1	I decide to play simultaneously with the child sharing a common part.	Child 13 plays the complete Fur Elise (first section) with moderate accuracy together with me.	This is the first time I introduce playing simultaneously sharing a common part, the activity is new, and it is difficult for the child to listen to my playing and play together at the same time (too much information to process / sensory overload) and therefore I acknowledge that he may get distracted which affects his accuracy in playing.
1.15 minutes	I.5.A.1	We then proceed to play Ode to Joy together sharing a common part but at the same time, I provide simple left-hand accompaniment (chord).	The child plays complete Ode to Joy with high accuracy together with me.	The child starts to be familiar with the activity and is able to maintain high accuracy while playing simultaneously with me.
3.22 minutes	P.5.A.2 P.5.A.4	Once I notice that the child is able to play two pieces accurately, I expand the materials with made-up short motifs for the child to imitate. This is to reinforce his imitation skill and concentration and also the ability to take turn with me.	The child watches when I play and imitate all the motifs accurately. He is also able to play in time.	This suggests that the child is motivated to play on the instrument despite what the music is. He has yet to develop a preference however his fondness to music motivates him to engage on the task all the time.
3	R.5.A.1	I start the session by playing Fur Elise	The child watches and listens	I recap the piece that the child was

17 seconds		for the child to listen.	attentively.	learning previously.
14 seconds	R.5.B.1	I play the dominant features of Fur Elise for the child to listen.	The child smiles showing recognition that of the dominant feature of the piece.	The child shows recognition of the piece through facial expression.
42 seconds	No strategy		The child then starts to play the piece from memory.	The child's advanced memory allows him to remember the materials accurately even without any practising involved.
5.35 minutes	P.5.D.1 P.5.A.1	As the child is now very familiar with the piece and is able to remember the materials, I proceed to teach him to play with proper technique and fingering. I demonstrate to play with good fingering using the hand-under-hand technique so that the child can feel the movement and shadow my movement of the fingers.	The child tolerates the input and is able to play the complete piece with good technique without my support after.	I introduce the skills and materials gradually based on the capability of the child. First, I focus on just the materials so that the child can enjoy the musicality side of the activity and once he is confident in playing the complete piece, I only move on to teaching the technical aspect of the piece.
32 seconds	R.5.B.1	I play Ode to Joy for the child to listen.	The child shows recognition of the piece (through smiling) when I play.	Although the child has only been introduced the piece once from the previous session, he is able to

				remember the materials which is shown through his facial expression.
2.10 minutes	P.5.A.1 P.5.D.1	I then support the child to play the piece with good fingering technique.	The child is able to play the entire Ode to Joy from memory. The child tolerates input and is able to play the piece with good fingering technique.	The child shows quick learning skill is able to play without my support. He is also able to play with good fingering technique after.
1.01 minute	I.5.B.1	Once I notice the child is confident in playing accurately without my support, I proceed to encourage the child to play simultaneously however maintaining an independent line while I play the left-hand accompaniment.	The child is able to play accurately and in time with me without any support needed.	One can see improvement in the child's musical skill where he is able to maintain his own independent part while playing together with me.
1.57 minutes	R.5.A.1	As the child has now mastered to play two pieces, I decide to carry on by introducing another new piece for the child to listen (Prelude in C by Bach).	At first, the child listens attentively however he then intervenes by starting to play Fur Elise again.	I assume that the child does not like the piece since he interrupts halfway through the piece or perhaps he is still processing the previous two pieces that he has learned.
7 seconds	I.5.B.1	I quickly join in by providing left-hand accompaniment.	He then changes quickly and starts to play Ode to Joy.	Child 13 once again successfully play the piece together with me accurately. It shows that he is familiar with the

				activity and perhaps with me as well as he is able to engage on the task throughout the session.
58 seconds	R.5.B.1	I play Minuet in G again for the child to observe if he remembers.	The child recognises the piece through smiling and starts to imitate the motif and engages in taking turns with me.	As stated previously, child 13 manifests advanced memory which he is able to remember all pieces that he has learned without the opportunity to practice or listen to these pieces aside from the lessons.
4.38 minutes	P.5.A.2 P.5.A.4	I engage in taking turns with the child. I then proceed in expanding the materials for the child to learn.	Child 13 engages throughout and when he is presented with new materials, he watches attentively and imitates.	It seems that child 13 stumble upon the difficulty of the materials as he struggles to remember and plays them accurately. However, he is very determined in learning where he keeps trying until he is able to play successfully. He only plays three times accurately out of ten.
4 30 seconds	R.5.A.1	I start the session by playing Fur Elise.	The child watches attentively and smiles.	The child has developed a particular structure on how the session should be conducted. First, the session should start with Hello Song, followed by Fur Elise, and then Ode to Joy, and then Minuet in G. If I deviate from the

				above structure, the child will stop me from playing and reinstate the structure.
23 seconds	No strategy		The child plays the complete piece without my support.	At this stage, the child has acquired the skill and the confidence that he needs to play the piece without my support.
1.51 minutes	I.5.A.1	I then start to encourage the child to play simultaneously sharing a common part.	The child plays together with me twice accurately.	It seems that the child is comfortable to play with me and starts to develop ensemble skill that is needed to perform with others.
1.45 minutes	P.5.D.1 P.5.A.2	I then continue to correct the child's tempo and rhythms and some of his techniques in playing with good fingerings. I cue the child to hold the notes with the correct length and to play in time.	The child does not always play in the accurate tempo or the accurate length of the notes. After repeating the task for five times, the child finally able to play in time and holding the note with the correct length.	As the child is able to play the entire piece, I progress to refine his techniques and other musical knowledge such as playing in time and holding the right length of notes.
29 seconds	I.5.B.1	As the child is able to play with correct tempo, I continue to provide left-hand accompaniment and	The child maintains his independent part while playing simultaneously with me.	The child has mastered the skill to play with me without support and develop ensemble skill that he can perform

		perform with the child.		with others in future.
43 seconds	R.5.A.1	I then move on to play Ode to Joy.	The child listens attentively and able to name the piece.	The child shows recognition of the piece.
3.01 minutes	P.5.A.1 P.5.A.2	I then support him to start with the accurate note and play throughout.	The child is very eager to play however he cannot find the correct note to start with. He keeps on playing the wrong notes on the piano.	It seems that the child is feeling slightly distracted today as he cannot concentrate on engaging on the task throughout. There are several moments where he is entirely off task and starts to play random keys on the piano.
41 seconds	I.5.C.1 I.5.B.1	I decide to join in with the child by providing left-hand accompaniment while he is improvising.	Out of the blue, the child starts to play on his own material, improvising on the note C and G.	It is unknown to me why he chooses those two notes to improvise perhaps the Ode to Joy which is in the key of C, he picks some of the materials from the song and decides to improvise on it.
3.34 minutes	P.5.A.2 P.5.A.1	I support the child to learn the materials again by holding his hand to play the song and provides cues occasionally while he is playing on	The child then starts to play Ode to Joy however struggles to get the materials correct. The child grabs my hand to	One can see that most of the events in the sessions are child-directed. I observe what the child is doing and then provide appropriate support for

		his own to reinforce his memory on the correct notes.	short him what to play.	the child to learn.
3.42 minutes	R.5.B.1 P.5.A.2	Once the child is able to play Ode to Joy, I progress to playing Minuet in G for the child to listen. I cue the child to play the correct notes when he struggles to remember.	The child listens attentively and immediately recognise the piece and shouts out the name of the piece repeatedly. The child is very eager to play however he has yet to be able to remember all the materials.	The child has yet to master this piece as he constantly forgets the materials. Perhaps compare to the other two pieces, the materials are much more complicated to learn and remember.
1.40 minutes	P.5.D.1	We finish the lesson with learning techniques (C major five-fingers scale). I demonstrate for the child.	Child 13 watches attentively and then starts to play the scale. He repeats the task for nine times as it is not always successful.	Child's determination motivates the child to repeat the task several times until he is able to play accurately.
6 22 seconds	R.5.A.1	I start the session by playing Fur Elise for the child.	The child watches and listens attentively.	It has become a routine that the session starts with Fur Elise where the child watches and listens attentively and then plays the entire piece without support.
24 seconds	No strategy		The child plays Fur Elise without my support.	

38 seconds	I.5.A.1	I then proceed by playing the piece again sharing a common part with the child.	The child plays together with me accurately and in time.	Child 13 is familiar with the piece and confident enough to play the entire piece without support with 100% accuracy and in time.
3.46 minutes	P.5.A.2 P.5.A.4	As I notice that the child is very comfortable with the piece and has mastered the materials, I decide to expand the materials by introducing the new section of Fur Elise for the child.	Child 13 watches attentively and imitates the material bar by bar.	The child is very focused on the task, this may due to his interest in learning the piece and his interest in the instrument itself that constitutes him to stay engage on the task all the time.
3.01 minutes	P.5.D.1 P.5.A.1	Since the child has mastered this piece, I decide to introduce new technique (hand coordination) to support the child to play with both hands. While the child is playing his right hand, I hold his left hand to play the accompaniment.	The child tolerates input and is able to play with both hands accurately for the first phrase.	This is a good piece to start with as the coordination for both hands is simple and only requires both hands to play one note simultaneously at once rather than a complete bar.
39 seconds	P.5.A.1 P.5.A.4	Once the child is able to play both hands for the first phrase, we continue to recap the new material. As the child is still struggling to remember the materials, I provide support by	He tolerates the input and is able to play the materials however he loses concentration again and starts playing the first phrase with both hands.	Perhaps there is a delay in information processing with the child and he is still processing the materials from the first phrase.

		holding his hand to play the current notes and take turns with him.		
40 seconds	P.5.D.1 P.5.A.2	I provide occasionally to support the child to play at the correct notes.	The child is able to play both hands accurately.	The child is a fast learner, on this attempt, he does not require physical support in playing both hands as he can manage on his own. I only provide cues when he forgets some of the left-hand parts.
3.44 minutes	P.5.A.2 P.5.A.4	I support the child by providing cues and occasionally take turns with him.	The child then proceeds to play the new section of Fur Elise again.	The child shows amazing musical skill when he manages to play the entire piece accurately at the end of the event.
45 seconds	R.5.A.1	I play Ode to Joy for the child with left-hand accompaniment.	The child watches and listens attentively.	
1.34 minutes	P.5.D.1 P.5.A.1	When the child notices that I play with both hands, this motivates him to wish to play with both hands as well. I then provide support by holding his hand	The child attempts to play with both hands however is not very successful. He then indicates me to demonstrate again.	With an intrapersonal catalyst, child 13 is motivated to learn new techniques (playing both hands) and when he fails to do so, he indicates me to demonstrate again.

4.45 minutes	P.5.D.1 P.5.A.1	I continue to support the child to learn his left-hand notes. While I hold his left hand to play on the correct keys, I sing the melody line for him as well so that he can associate the accompaniment with the melody without having to play it physically.	Child 13 is very focused on the task and allows me to hold his hand to learn the left-hand accompaniment. He sings together with me as well.	I focus on one task at a time as I acknowledge the difficulty of having to learn the left-hand accompaniment while playing the melody line at the same time, therefore, I sing the melody line to the child so that he can associate the accompaniment with the melody but concentrate on learning the left-hand materials.
37 seconds	R.5.A.1	Once we have spent adequate time on learning Ode to Joy left-hand accompaniment, I move on to play Minuet in G for the child.	Child 13 watches and listens attentively.	
2.11 minutes	P.5.A.2	I then support him to recall the materials by providing cues.	Child 13 forgets the materials and cannot proceed.	It seems that Minuet in G is not child 13's favourite piece as he keeps on forgetting the materials. Perhaps it may be due to the complexity of the piece as compared to the previous two.
7 48 seconds	R.5.A.1	The session starts with me playing Fur Elise for the child again.	Child names the piece showing recognition and watches attentively.	

2.19 minutes	P.5.D.1 P.5.A.2	First, I observe and allow child 13 to perform the entire piece, when he continues to play the second section with left-hand accompaniment, I support him to learn the materials by providing cues.	Child 13 plays the entire piece from memory with some left-hand accompaniment which he learned from the previous session. He then starts to play the second section with left-hand accompaniment as well which is new to him.	The child's interest and motivation to learn is shown here where he continues to play left-hand accompaniment of the second section without me instruct him to do so. At the end of the event, he is able to play the entire piece with left-hand accompaniment.
54 seconds	R.5.A.1	Once the child is able to play Fur Elise with both hands, I proceed to the next piece – Ode to Joy.	The child watches and listens attentively.	
3.19 minutes	P.5.D.1 P.5.A.1	I provide support for child 13 to play left-hand accompaniment as he only learned the materials last session.	The child is able to play melody line while letting me to support him in playing the left-hand accompaniment.	Child 13's motivation to learn keeps him engaged on the task throughout. At the end of the event, he is able to play the entire piece with left-hand accompaniment with minimal support from me.
1.07 minutes	R.5.A.1	I then proceed to play Minuet in G.	Child 13 watches and listens attentively.	
3.38 minutes	P.5.A.2	As the child still seem to be unable to	The child watches and imitates the	While the child is yet to remember the

		remember all the materials accurately, I provide support by demonstrating each bar and pauses for the child to imitate.	materials.	materials, I provide appropriate support such as breaking the piece down and letting the child imitate her bar by bar.
2.32 minutes	R.5.A.1 P.5.B.2	At this stage, I recognise that the child has mastered at least two pieces that we learn, it is time to progress in introducing a new song. Here I introduce a new song (Twinkle Twinkle Little Star) and also transposition.	It is the first time the child is exposed to transposition. He watches and listens, and he is able to recognise the song when he starts singing along with me.	I play a song that is familiar with the child as I want to introduce transposition (new skill) and it is easier for the child to learn while he is already familiar with the materials.
4.43 minutes	P.5.B.2 P.5.A.1	I support the child to learn the materials by holding his hand and transposes the materials from C major to D flat, D, E flat, E, F, F sharp and G major. I provide left-hand accompaniment on the last note to indicate the directions of the transposition.	The child tolerates the input and he laughs and smiles when he realises we are transposing the materials into different keys.	The child's musical ability allows him to realise that transposition is taking place and that he finds this amusing.
8 47 seconds	R.5.B.1	I play Fur Elise for the child.	The child watches and listens attentively.	At this stage, the child is already very familiar with the piece.

1.33 minutes	No strategy		The child plays the entire piece from memory with both hands without my support.	
52 seconds	R.5.B.1	I then progress to playing Ode to Joy.	The child watches and listens attentively.	
3.05 minutes	No strategy		The child plays the entire piece from memory with both hands without my support.	
41 seconds	R.5.A.1	I play a short material from Minuet in G.	The child listens and watches attentively.	
2.52 minutes	No strategy		The child plays the phrases from memory however he cannot remember all the phrases. He then repeats the first two phrases several times until he is able to recall the following phrases and carries on.	The child is very self-motivated as he does not require my help in playing the phrases and even though he cannot recall, he attempts to do it by himself.

9.03 minutes	I.5.B.1 P.5.B.2	I then continue to demonstrate Twinkle Twinkle Little Star and support the child to transpose the piece to various keys.	The child modulates the piece to various keys while I play the left-hand accompaniment. The child is able to name all the starting notes before he starts playing on each of the transposition keys.	Child 13 shows advancement is musical ability where he is able to maintain his own part and transpose the song to various keys while I provide left-hand accompaniment.
1.05 minutes	P.5.B.1	Once the child has transposed the materials to various keys, I then introduce the child in improvising the materials.	The child watches and imitates in return.	I introduce improvisation first by demonstrating to the child for him to imitate and gradually leads him to improvise on his own.
1.09 minutes	P.5.A.2	The child is eager to learn to play Goodbye Song as well and so I help him to learn the materials by allowing the child to imitate me.	The child plays the entire Goodbye Song with my support (imitation).	The child's interest in playing the instrument extends even to desire to learn to play the Goodbye Song himself instead having me to play it for him.
9 43 seconds	R.5.B.1	I play Fur Elise for the child.	The child listens attentively and shows excitement (smiles).	
3.05 minutes	P.5.D.1	The child seems to forget how to play Fur Elise with both hands. I provide	The child engages throughout and he is enjoying it.	Although the child seems to be forgotten some of the materials, with

	P.5.A.2	support to the child to play Fur Elise with both hands.		some of my help, he is able to pick it up and carry on from there.
40 seconds	R.5.A.1 R.5.B.1	I play Ode to Joy for the child.	The child listens and watches attentively.	
2 minutes	P.5.D.1 P.5.A.2	I provide support occasionally for the child to play with both hands.	The child recaps Ode to Joy however it seems that he has forgotten some of the materials.	With appropriate support, child 13 is able to play the entire piece with both hands again.
43 seconds	R.5.A.1 R.5.B.1	I then continue to play Minuet in G.	The child listens and watches attentively.	
3.24 minutes	P.5.A.2 P.5.A.1	As the child still struggles to remember the materials, I provide support by holding his hand to play and pauses for him to imitate.	The child tolerates the input and engages throughout.	
11.10 minutes	I.5.B.1 P.5.B.2	At this stage, the child is able to transpose the song into various keys. Here, I provide left-hand	The child transposes the song into various keys and maintains his own part	The child has become familiar with me and comfortable to play simultaneously with me. Moreover, his

		accompaniment while the child transposes the song into various keys.	while playing simultaneously with me.	musical ability has improved as he is able to transpose the song into various keys without my support.
1.10 minutes	P.5.B.1	I then continue to play improvised Twinkle for the child to imitate.	The child imitates the materials and engages on the task throughout.	
1.05 minutes	R.5.A.1	As the child has mastered the previous pieces, I decide to introduce a new piece for him, Sonata in A by Mozart.	The child watches and listens attentively.	I constantly introduce new pieces for the child so that he is exposed to a wide range of repertoire.
2 minutes	P.5.A.2 P.5.A.1	I play the materials and pauses for the child to imitate.	The child imitates accurately. However he likes to feel the movement of my hand and so occasionally he will put his hand on mine and watches.	The child's interest in learning new pieces is shown through his initiation in asking my support.
40 seconds	P.5.A.1	I support the child to play the entire Goodbye Song.	The child tolerates the input and engages throughout.	
10 30 seconds	R.5.A.1	Upon his request, I play Sonata in A for the child.	The child requests me to play Sonata in A instead of Fur Elise today.	Unusual deviation from routine where the child requests for Sonata in A instead of Fur Elise. Perhaps the child is keen to learn the new piece.

4.09 minutes	P.5.A.2 P.5.A.1	I support the child to learn the piece.	The child tolerates the input and imitates the materials in return.	Although the piece is more complex than the previous pieces he learned, child 13 engages throughout and learns the new materials patiently.
43 seconds	R.5.A.1 R.5.B.1	We then proceed to Fur Elise.	The child watches and listens attentively.	
1.23 minutes	P.5.D.1	I start with recapping the left-hand accompaniment just to make sure the child remembers.	The child imitates the materials in return.	The child is able to remember the materials.
4.28 minutes	P.5.D.1 P.5.A.1	I support the child when he forgets the materials.	The child starts playing the entire piece with both hands with minimal support from me. But at the 2nd section, the child forgets his left-hand accompaniment again.	When appropriate support is given, the child is able to learn and remember the materials.
40 seconds	R.5.A.1 R.5.B.1	When the child successfully plays Fur Elise with both hands, I continue to play Ode to Joy.	The child watches and listens attentively.	

3.32 minutes	No strategy		The child plays Ode to Joy with both hands repeatedly.	The child constantly needs to start over again when he makes mistakes, therefore, the event is longer than usual to complete the entire piece.
30 seconds	R.5.A.1 R.5.B.1	I then proceed to play Minuet in G for the child.	He watches and listens attentively.	
2.15 minutes	P.5.A.2	When the child struggles to remember the materials, I provide support by cueing him the right note.	The child tries to play Minuet in G from memory however he does not seem to recall the materials.	The child is yet to be able to remember all the materials.
5.45 minutes	I.5.B.1	We then proceed to play Twinkle with various keys.	The child transposes the song into various keys and plays simultaneously with me while I provide left-hand accompaniment.	It is evident that child 13 has grasped the fundamental skills in playing pieces that he learned and his interest in music highly motivated him.

Appendix 20 – Child 14

Child 14

Session/Duration	Strategies	Researcher's actions	Child's actions	Interpretations
2 28 seconds	R.5.A.1	I play Minuet in G.	The child listens attentively; he likes the song which shows through his facial expressions smiling.	It seems that the child likes the choice of the song which he shows through his facial expressions. This has motivated the child to be attentive throughout the strategy and learn to imitate me. The child finds it difficult to remember the phrases due to it is his first time learning the piece. It seems that with my support, the child is able to learn the material.
2.09 minutes	P.5.A.2 P.5.A.4 I.5.B.1	I teach Minuet in G and breaks the piece down into short phrases, one bar at a time. I use imitation for the child to imitate.	The child imitates mainly accurately and takes turn in playing the piece with me. Learning short phrase one at a time. The child enjoys the activity through smiling and willingness to cooperate. When I cue the child to play without imitation/support, the child is able to play the phrase accurately.	
1.01 minute	P.5.A.2	I continue to expand the phrase, two bars at a time now.	The child continues to imitate. Without support, Child 14 finds it difficult to remember two phrases at a time. With appropriate support such as prompt/cue, Child 14 is able to play.	

59 seconds	P.5.A.1 P.5.D.4	I support the child to play with good fingerings.	Child 14 tolerates the input and play with proper fingerings. However, when I let go of his fingers, he continues to play with just one finger. He is not used to playing with proper techniques yet.	The child is yet to establish playing with good fingering.
44 seconds	P.5.A.1 I.5.B.1	I repeat the materials and take turns with the child. The child is only playing one bar at a time while I continue the rest.	Child 14 takes turn with me. By just playing one short phrase, it becomes a doable task for the child as he can remember the repetitive materials while learn to take turn with me. At the same time, he is maintaining his own independent part while I provide left-hand accompaniment.	By introducing the materials which divide into smaller phrases, the child can learn the materials gradually and help the child to build confidence in learning new materials. This goes in line with Evan's motivational theory that children and adults having beliefs on their abilities which guide their thinking and behaviour. I notice that by breaking the materials into shorter chunks, the child engages more.
37 seconds	R.5.A.1	I introduce a new song to the child.	The child first listens attentively, looks at the score and my hand playing on the piano. He then spots the letter notation on the score and notices that I am playing the same letter on the piano. He is fascinated by it, this can see through his smile and	The new song motivates the child and the letter notations I introduce.

			points to the score and to the piano trying to tell me. He then moves his body with the music. He starts to put his hand on the piano eagerly ready to start to learn the piece.	
1.34 minutes	P.5.A.3	I point to the letter on the score while the child plays on the piano.	The child is able to play the whole piece by reading the letter notation and transferring them on the piano. Although the keys are all over the place in different registers, he is enjoying playing the piece and able to play throughout.	This shows that the child is capable of reading letter notations however it is unclear if the child understands or able to identify the pitches when the letters are taken away.
1.38 minutes	P.5.A.1 P.5.D.4 P.5.A.3	I want to support the child to play with good fingerings and at the correct register.	First, I hold the child's hand to play with good fingerings. The child tolerates for one or two seconds, but then he wants to play by himself. I correct him to play at the correct register but allow him to play the whole piece without correcting his fingerings.	Here, I am not concerned with the technique yet as the musical aim is to be able to play the piece. Once that has been achieved, I will gradually introduce the correct technique such as the correct fingerings.
1.01 minutes	P.5.D.4 P.5.A.3	As the child only plays with one finger, it is difficult to alter his technique to play with all fingers. I	The child starts to utilise most of his fingers and starts to play with 3 fingers. His hand position on the	

		decide to start with playing with 2-3 fingers and then slowly expand.	piano is much better than what he played previously.	
46 seconds	P.5.A.3	Once the child has established to play with more than one finger and also know the piece well, I now expand to teaching note values, teaching the child to hold the minim beat long by colouring the letter with yellow so that the child can visualise.	The child is able to read the letter notation and play the whole piece. With my support (colouring the longer value note), the child is able to hold the note longer to its value. Although at this stage, the child has yet to grasp the concept of note value.	Besides using visual label such as letter notations to help the child in recognising the keys, I also use colour to indicate the value of the note to help the child in learning note value. However, I notice that the child is yet to grasp the concept. However, the child is motivated to learn and starts to remember to hold the note longer.
43 seconds	I.5.A.1 P.5.A.3	Now I use the same material and play a short duet with the child, sharing a common part with him.	The child plays together with me sharing a common part. He remembers to hold the note longer by saying out loud 'hold'.	
52 seconds	P.5.A.2	I want to use the same material to assist the child in remembering the material. This is to learn to enhance his memory. I take away the score and demonstrate on the piano for the child to imitate. This is also known as rote learning.	The child imitates me. When I cue the child to play without my support/demonstration, the child struggles to remember. I notice that it may be too early for the child to start memorising the piece.	Perhaps the child needs a longer time to remember the materials. The child does not possess absolute pitch like child 12 and child 13, and as compared to the other two children, Child 14 needs longer time to learn and remember the materials.

1.40 minutes	P.5.A.3 I.5.B.1	I decide to allow the child to play the piece again using letter notation to help him familiarise with the song.	The child is able to play the whole song without my support by reading letter notation. He is also able to maintain his independent part while I play the left-hand accompaniment.	Visual labels help the child to match the notations onto the keys.
1.12 minutes	R.5.A.1	I decided to introduce a new song to the child, Mozart's Eine Kleine Muzik.	The child sits attentively however one can tell he does not like the song as compared to the previous two as he starts to look around the room. His attention got distracted.	Perhaps the child's attention has dropped or that he does not like the pieces, therefore, he is not attending to the song.
1.05 minute	R.5.B.1	The child has requested to play Minuet in G.	The child recognises the piece. This is shown through his facial expression, smiling and moving to the music.	The child shows recognition to the piece and is attending to the piece as well.
1.05 minutes	P.5.A.2	I decide to recap the song by cueing the child to play and take turn with him.	When I cue the child to play, he cannot remember the material. I support him by demonstrating the material for him to copy. He is then able to play and takes turn with me.	It appears that the child still needs more time in remembering the materials.
55 seconds	R.5.B.1	I continue to play the piece.	The child starts to play on random	I do not stop him as I want to observe

			keys however one can see that he is imitating the rhythms I play. He is enjoying and having fun playing together with me.	what is the child is doing and what can he do. I assume that the child is improvising together with me.
2.33 minutes	P.5.D.1 P.5.A.2	I start to introduce musical concept (scales – major).	The child learns through imitating.	Here, I start to introduce techniques, guiding the child to play with good fingering work.
4 38 seconds	R.5.B.1	I play Ode to Joy for the child.	The child is not paying attention today and is playing random keys on the piano while I am playing. He is looking away from the piano as well.	Perhaps the child is coping transitioning of task, therefore, he is not able to focus.
45 seconds	P.5.A.3	I ask the child to play by reading the letter notation.	The child seems a little distracted today. It takes some time for the child to pay attention to what I am asking him to do. After 5-10 seconds of drawing his attention back to the piano, the child finally settles and plays the piece by looking at the letter notation.	
1.38 minutes	P.5.D.4	I support the child to play with proper fingerings.	The child tolerates the input by putting his hand on top of mine to help	Using kinaesthetic modality to help the child to feel the movement in the

	P.5.A.3		him to play with proper fingerings.	execution of individual fingers.
54 seconds	P.5.A.3	I ask the child to play the piece again by reading the letter notation.	The child plays the song by reading the letter notation.	Using visual labels to support his learning.
37 seconds	P.5.A.2	I then take away the score to help the child to play by ear to enhance his memory.	The child successfully imitates the first bar. However, he starts to play random keys on the piano. I ask him to copy again, he refuses and starts to play Twinkle Twinkle Little Star.	Perhaps the child is more interested in learning the song that he likes. This goes in line with self-motivational theory.
1.21 minutes	P.5.A.1 P.5.A.2	I support the child physically and cue the child to play Twinkle Twinkle Little Star	The child is very interested in playing the song. Perhaps he learns this in his music lesson. He is able to tolerate my support in assisting him to play the song throughout.	The child is motivated to learn the song that he likes.
27 seconds	R.5.B.	I play Twinkle Twinkle Little Star.	The child listens attentively and sings along with me.	The child is attending to the song.

41 seconds	P.5.A.2 I.5.B.1	I support the child to play Twinkle Twinkle Little Star through prompting.	The child plays the entire song with my help. One can see that he is enjoying the song that he smiles throughout and sings at the same time as well.	Although the child knows the song, it is new for him to play this on the piano. Therefore, I support him in various ways. Prompt him to play the correct notes.
25 seconds	R.5.B.1	I play Minuet in G.	The child smiles when I play the song which shows he recognises the song. His attention sways towards the end and looks away from the piano.	The child is attending to the piece however he has short attention span.
1.39 minutes	P.5.A.1 P.5.A.2	I demonstrate Minuet in G again for the child to imitate	The child finds it difficult to imitate, and so I provide physical support to help him to play the correct notes.	As the child does not have absolute pitch and advanced memory skill like Child 12 and 13, I notice that using physical support is the best way to guide the child as he can see and feel precisely which note to play.
15 seconds	P.5.A.1	I continue to provide physical support to help the child to play Minuet in G and extend the materials to more bars.	The child is able to tolerate input and eager to learn. He engages in the task throughout.	
1 minute	P.5.A.4 I.5.B.1	I play simultaneously with the child taking turns in bars.	The child is able to play some of the bars without physical support and is able to take turn with me. He enjoys	The child is able to play simultaneously with me. It is considered as an advanced skill of performing as it implies hearing

			the activity and engages throughout the task.	and concentrating on two parts at once. One must adjust his/her contribution to fit another's in real time.
29 seconds	R.5.A.1	I introduce a new piece - Haydn Choral.	The child does not like the piece and starts playing Minuet in G by himself while I am still playing.	Perhaps this may due to delay in processing. Alternatively, perhaps the child dislikes the piece and plays something else to block my playing.
1.59 minutes	P.5.A.1 P.5.A.2	I continue with Minuet in G and expand several bars.	The child is unsuccessful in trying to imitate my playing. This may occur due to the child not remembering the material. I provide physical support to help him.	Since the child initiates to play Minuet in G, I decide to continue to work on the piece.
2.46 minutes	P.5.A.2 P.5.A.1	I continue with Minuet in G as the child is very keen on learning.	The child engages on the task while I demonstrate the material and support the child to play through physical support. I notice that the child is not very good in imitating and so by providing physical support in pressing the correct keys will help the child.	As mentioned above, the child struggles in imitating and therefore, physical support work as a better strategy in guiding the child to learn the materials.

20 seconds	R.5.B.1	I play the short section again for the child to listen.	The child listens attentively and smiles but at the mid-section, he covers his ears for about 3-4 seconds.	It is unknown what causes the child to cover his ears, perhaps he is experiencing sensory overloading or he does not like the piece. Therefore, he is blocking the sound.
1.08 minute	P.5.A.2	I cue the child to play the whole section.	The child engages and manages to play the whole section with my cue.	The child is responding well to the cues.
1.08 minute	R.5.A.1	I play Haydn Choral again for the child to listen.	The child listens attentively but not consistently.	Unlike Child 12 and Child 13, Child 14 has a shorter attention span where he cannot attend to the whole piece. He will look away however although he is not looking, he may be internalising the piece.
5 33 seconds	R.5.B.1	I play Twinkle Twinkle Little Star for the child. Recap from the last session.	After I play the song, I ask if the child likes it. The child comments it is a song for 'baby', he does not want to play it. It is a baby song. So I decide to stop and play Ode to Joy.	The child changes his opinion on the song as last session he likes the song very much. Perhaps this is because he has been learning about being independent and adult in the class and therefore he comments on Twinkle Twinkle Little Star being a baby song.

37 seconds	R.5.B.1	I play Ode to Joy.	The child recognises the song by expressing verbally and smile. When I complete the song, the child wants to play as well however he is constantly playing the wrong notes. I offer to help by providing physical support (holding his hands) to play but the child is reluctant and keeps saying 'I'm big boy, no help'.	Through his facial expressions, I know that he recognises the song and he is excited about it. Again, the child is commenting on being a big boy and reluctant to receive any support.
4.29 minutes	P.5.A.1 P.5.A.2	I support the child to play Ode to Joy.	The child is very reluctant for me to help today and it takes a long time to convince the child to play with my support. Once the child has accepted my help, he engages on task and plays the whole piece with my help.	The child finally accepts my help.
6.03 minutes	I.4.A.1 I.4.B.1	The child suddenly plays a short motif for me to imitate.	I decide to join in to see what the child is going to do. This has then turn into motifs imitation game between me and the child. The child enjoys it and when I stop, he requests to continue with the imitation of short motifs.	It seems that although Child 14 is regarded as functioning at Level 5 on SoI framework, there is still some musical activity that the child enjoys from other levels.
1.41 minutes	P.5.D.1	I introduce to play with good	The child tolerates the input. He plays	The child starts to learn techniques.

		fingerings (five fingers) and short C major scale	ascending pattern of notes up and down the octaves with good fingerings (5 fingers).	
7 40 seconds	R.5.B.1	I play Ode to Joy.	The child listens and watches attentively.	The child is attending to the song I play.
3.55 minutes	P.5.A.1 P.5.A.2	I support the child to play Ode to Joy. Using physical support and demonstration for the child to copy.	The child tolerates the input and listens to the instructions. He manages to imitate short phrases.	The child engages throughout the task. It seems that the child is able to focus on the task for a longer time.
33 seconds	R.5.B.1	I ask the child if he wants to listen to Twinkle Twinkle Little Star again.	The child said Yes, however, he is not paying full attention while I am playing. He disrupts the event by playing random keys on the piano.	Perhaps the child is eager to play the song.
33 seconds	P.5.A.1 I.5.B.1	I support the child to play Twinkle Twinkle Little Star and let the child maintain his own part while I provide left-hand accompaniment.	He enjoys playing the song as he is smiling throughout when he plays the song.	The child appears to like the song and engages on the task.

42 seconds	P.5.A.2	I help the child to play the whole song by cueing the correct keys.	The child is learning to play from memory and is still unable to play 100% accurately but with the cue, he manages to play the whole song.	I help in to recap the materials through cueing him to play the accurate notes. This is to reinforce the child's memory in remembering the material.
31 seconds	P.5.A.2 I.5.B.1	Again, I support the child to play the whole song by cueing the correct keys and provide left-hand accompaniment at the same time as well.	The child engages on the task. He manages to play the whole song together with me with some of the cues.	
1.14 minutes	P.5.B.3 P.5.A.2 I.5.B.1	I transpose Twinkle Twinkle Little Star to D major and demonstrate for the child to imitate. I support the child to learn by cueing the correct notes and provide left-hand accompaniment at the same time.	The child recognises the change of key through smiling and watches attentively what I am playing. He then copies and with some help with the cues.	Here, the child starts to learn transposition of the material.
53 seconds	I.5.A.1	I play Twinkle Twinkle Little Star with the child sharing a common part.	The child is able to play D major Twinkle Twinkle Little Star sharing a common part with me. Occasionally, he needs help when he cannot remember some of the parts. But he manages to play more than half of the material by himself.	The child is improving in remembering the materials. He is also able to perform with me sharing a common part.

28 seconds	R.5.B.1	I play Minuet in G again for the child.	The child recognises the piece which is shown through his facial expression (Smile). He loses concentration on the last 10 seconds looking slightly away from the piano.	The child has a short attention span. He has also grown familiarity with the piece.
1.04 minutes	P.5.A.4 P.5.A.2 I.5.B.1	I support the child to play a short phrase of Minuet in G again using turn-taking and cueing. I am playing left-hand accompaniment at the same time.	The child cannot remember how to play the piece and so I support the child to recall the material through cueing and taking turn to play short phrases. The child engages on the task but his attention drops and starts to play random motif.	By providing appropriate support, one can help to reinforce the child's learning and enhance his memory.
3.27 minutes	I.4.B.1 I.4.A.1	Again, this has turn into imitation game between me and the child.	The child and I improvise short motifs for each other to imitate. The child starts to play ascending and descending notes.	The child and I tune into each other and engage in a fun imitation game. Although such activity is regarded as Level 4, I decide to proceed with the activity as the child seems to be having fun.
1.01 minutes	P.5.A.2	I take the opportunity and turn the patterns into learning ascending pattern of major scales.	The child listens and imitates my playing but not always successful. But he manages to play when I provide cues to help him.	The child learns some musical concept (explicitly).

1.05 minutes	R.5.A.1	I introduce a new song by Stevie Wonder.	The child listens attentively and he occasionally smiles as well. When I ask if he likes the song, he says Yes.	The child is attending to the song I play. I am trying to provide a wide range of repertoire for the child to listen.
3.08 minutes	P.5.A.2 P.5.A.1 P.5.A.4	I support the child to learn to play Stevie Wonder with short phrases.	The child is able to imitate all the short phrases accurately. At this stage, the child is unable to memorise the short phrases but manage to play all of them accurately through imitation and cue. He is also taking turn with me.	The child seems to be keen to learn the song and motivates him to stay on the task for an extended period.
1.02 minutes	R.5.B.1	I play the whole song to the child again.	The child listens very attentively and occasionally move his head with the music. The child seems to enjoy the song.	The child recognises the song and is attending to it as well.
9 42 seconds	R.5.B.1	I play Ode to Joy for the child.	The child watches and listens.	The child is able to recognise the song and is attending to the song.
36 seconds	P.5.A.1	I support the child to play the piece by holding his hand. I want to achieve playing with good	The child tolerates the input and is able to play with good fingerings with	The child allows me to support him to play with good fingerings. Although he is yet to develop proper technique, it is

		fingerings.	my support.	through many practices and repetitions the child will master the technique.
4.16 minutes	P.5.A.2 P.5.A.1 P.5.A.3	I combine various strategies to support the child in learning to play the piece first through cue and demonstration for the child to imitate. Occasionally, I provide physical support by holding the child's hand.	The child engages on the task throughout. He is very focused on learning to play the piece with my help. He starts to read the letter notation as well.	I notice child 14 prefers visual support such as using letter notation to help him visualise the letters to play the piece.
	No strategies		The child is able to play without my support and reads the letter notation on his own.	
2.04 minutes	P.5.A.1 P.5.D.1	I support the child using hand-under-hand and hand-over-hand to learn to play with good fingerings.	The child tolerates the input. He seems to enjoy more when his hand is on top of mine, so he can be in control and feel my fingers playing on the piano. This is shown through his facial expression (smiling).	I support the child to learn proper technique and using hand-under-hand is a good technique as the child is able to feel the execution of my fingers.
11 seconds	R.5.B.1	I complete the remaining repertoire.	The child listens attentively.	The child is attending to the song,

34 seconds	P.5.D.1	I introduce to play five finger exercises ascending and descending of C major scale. I provide physical support, hand-over-hand to help the child to play with 5 fingers.	The child tolerates the input. However his concentration sways in the last 5 seconds and interrupts me by requesting to play Jingle Bells.	It is an unusual request as it is yet to be Christmas but the child has already requested to play Jingle Bells. Perhaps he encounters the song somewhere.
36 seconds	R.5.A.1	I play Jingle Bells which requests by the child.	One can see that the child enjoys the song as he starts smiling when I play the song. He moves his body with the music as well. He then requests another song but I have no idea what song he is talking about and therefore cannot fulfil his request. The child then requests to play Twinkle Twinkle Little Star.	The child is attending to the song.
29 seconds	R.5.B.1	I play Twinkle Twinkle Little Star.	The child looks happy where he smiles when I play the song and he moves together with the music as well.	
58 seconds	R.5.A.1	The child chooses a song from the book and I play.	The child listens attentively, and he starts to join in (seems like he is imitating the rhythm or improvising	The child is attending to the song and although he is playing random notes on the piano, it seems that his rhythm

			with me) playing random notes.	matches mine.
58 seconds	R.5.A.1	I introduce The Entertainer to the child.	The child recognises the song as it is the song from a game he plays 'Super Mario'. He smiles and moves with the music.	The child is attending to the song and he likes it.
51 seconds	P.5.A.3 I.5.B.1 P.5.A.1	I take Twinkle Twinkle Little star score for the child to play.	The child plays the whole song by reading letter notation and my support. I provide physical support to make sure the child is playing at the correct keys. I also provide left-hand accompaniment as well.	
1.56 minutes	P.5.B.1 P.5.A.1 I.5.B.1	I support the child to transpose the song into D flat major, D major and at the same time provide simple bass line harmony.	The child is able to transpose the song into various keys with my support.	The child shows improvement where he is able to transpose the song into two different keys.
58 seconds	P.5.B.4 P.5.A.1	The child attempts to transpose the song into minor key. He tries to find the correct sound. I support the child by providing physical		It is unusual that the child wishes to transpose the song into minor key. It is fascinating to see how the child transforms musically.

		support and cues.		
45 seconds	R.5.A.1	I introduce a new song Carmen.	The child does not seem to be very interested. He is not looking at the piano. Perhaps he is listening.	The child is encountering the song but not attending to it.
2.54 minutes	P.5.A.1 I.5.B.1 P.5.A.2	I support the child to learn to play Carmen's theme. First by holding his hand to play the notes. I then repeat the phrase through demonstration.	The child seems to enjoy me holding his hand to press down the keys. He is smiling throughout. The child tries to imitate but is not very successful. He is then able to play when I provide cue.	One can see that the child starts to get tired and towards the end he stops and refuses to play and requests to finish the lesson.
11 2.06 minutes	P.5.D.1	I introduce to sit with good posture with a picture of a boy sits straight on the piano. I put the picture on the piano so that the child can look at it from time to time as a reference.	The child engages when he sees the picture and sits up straight with good posture.	Using a picture to help the child to visualise sitting with good posture and serves as a reminder throughout the session.
43 seconds	P.5.A.1 P.5.D.1	I recap the material from last week – Twinkle Twinkle Little Star. I support the child to play with good fingers.	The child tolerates the input and allows me to support him physically. His attention starts to drop halfway through the event.	The child has a short attention span.

37 seconds	R.5.B.1	I play The Entertainer for the child.	The child enjoys the song. This can be seen from his facial expression where he smiles throughout.	The child recognises the song and is attending to it.
52 seconds	P.5.D.1	I support the child to play 5 finger exercises. Ascending and descending of C major 5 notes scale.	The child tolerates the input with me supporting him hand over hand to play C major 5 note scale ascending and descending. When I ask the child to play by himself without support, he successfully plays the whole scale ascending and descending accurately without any support.	One can see he enjoys the activity as well that he is smiling throughout. The child also shows improvement in his technique as he is able to play independently without support.
1.16 minutes	P.5.D.1	I point to the picture to remind the child to sit with good posture.	The child immediately corrects his sitting posture.	The picture is an excellent strategy to remind the child to sit with good posture.
20 seconds	P.5.D.1	I ask the child to play C major 5 note scale again.	The child is able to play accurately throughout.	The evidence suggests that the child is able to demonstrate what he has learned. Here it shows that the child is able to remember the material as well.
1.05 minutes	R.5.A.1	The child requests to play The Entertainer.	The child smiles throughout the song and engages excitedly on the task.	The child is attending to the song.

21 seconds	P.5.A.3	I recap Ode to Joy from the previous session.	The child plays Ode to Joy by reading the letter notation.	The child has gained familiarity of the song and is able to engage on the task.
1.31 minutes	P.5.A.2 P.5.A.1	I take away the score and demonstrate Ode to Joy. I want the child to play through imitation to help with his memory.	At first, the child seems to lose concentration and does not imitate correctly. I support him to play physically. He tolerates the input, but he is not looking at what I am doing. He is looking around the room.	The reason of taking away the visual notation is to help the child in learning the piece through memorisation. This is to enhance his memory skill.
40 seconds	R.5.B.1	I play Ode to Joy for the child to listen.	The child seems to enjoy listening than playing.	The child is attending to the song.
38 seconds	P.5.A.2 P.5.A.4 P.5.A.1	I want to try again to support the child to play the whole song.	The child is able to play the first line of the piece. I then decide to take turn with the child. He plays one line and then I play the second line. The child seems to be more engaged in this way.	By breaking down the pieces into a smaller section, the child finds it easy to complete the task.
12 1.05 minutes	P.5.D.1	I show the good posture picture for the child again.	The child immediately corrects his posture by sitting up straight.	The child shows recognition of the picture and is able to correct his posture without my support.

37 seconds	R.5.B.1	I play Ode to Joy to the child.	The child listens attentively.	The child is attending to the song.
43 seconds	No strategy	The child attempts to play Ode to joy from memory but cannot remember most of the material. Unsuccessful in recapping.		
1.51 minutes	P.5.A.1 P.5.D.1	I provide help by holding the child's hand to play with good fingering.	The child tolerates the input.	
2.03 minutes	P.5.A.1 P.5.A.2	I continue to support the child and provide cue from time to time to help the child.	The child tolerates the input and engages in the task. He is near to success in playing with good fingering.	One can see that by providing constant support, the child eventually will be able to play with good technique.
23 seconds	No strategy	The child is finally able to play ode to joy with good fingering with minimum support from me.		

47 seconds	R.5.A.1	I play a new song to the child – Bach.	The child listens attentively at first however towards the end his attention sways away and starts to interrupt me and reluctant to engage.	The child has a short attention span.
23 seconds	R.5.B.1	I try to persuade the child and play the new song to the child again.	The child listens attentively this time.	The child is attending to the song.
50 seconds	P.5.A.2	I introduce to learn the first phrase of the song.	The child imitates successfully.	

Appendix 21 – Modified Piano Framework

Level	SoI Element	Sounds of Intent Descriptor	Piano Pedagogical Context	Pupil's Engagement	Strategies Code / Teacher's Input	Additional information	Anticipated Learning	Success Criteria
2	**R.2.A**	Shows an awareness of sounds – potentially an increasing variety	In this context, the piano will not be used in the conventional way, by which the teacher teaches the child to play the piano. Instead, the piano is used as a resource tool for making a range of sounds. It acts as a percussive instrument which the teacher uses to show the variety of sounds that it is possible to achieve on the piano. This assists the child to explore the various sound	The child listens. The child may not approach the piano and listen to the sound in a conventional way. The child may wander off, put their hands on the soundboard to feel the vibration, or put their ear to the piano to listen to the sound.	**R.2.A.1** The teacher demonstrates making a range of sounds and playing short pieces on the piano. **R.2.A.2** The teacher uses hand-under-hand/hand-over hand technique to assist the children to 'feel' the source of the sound.	1. The teacher should allow ample time for the child to respond or process the sound. Wait for at least 10 seconds before another attempt. 2. These two strategies can be used alternately on the same child. E.g. The teacher uses R.2.A.2 initially to assist the child in gaining awareness of sound from the piano however the child cannot tolerate the tactile input throughout, the teacher can then change the strategy	The child comes to appreciate that the piano is capable of making sounds	The child reacts to sounds made on the piano, eg. Through facial expressions (smile, vocalise, laugh etc)

			textures.			to R.2.A.1.		
	R.2.B	Makes differentiated responses to qualities of sounds that differ (e.g. loud/quiet) and/or change (e.g. get louder)			**R.2.B.1** The teacher plays short pieces on the piano with variety of dynamics.	1. The teacher should made several attempts on one type of sound before moving to another type of sounds. 2. The teacher has to be sensitive while performing loud sound as some students may exhibit hypersentive to loud sound.	The child comes to appreciate that the piano is capable of making different range of sound qualities.	The child reacts to the different quality of sounds that is made on the piano.
2	**P.2.A**	Make sounds intentionally, potentially through increasing variety of means and with greater range of control.	The piano is used as a basis for the child to explore a variety of sound textures, such as the difference between pressing an individual note and a cluster of notes. The piano is used as a sensory means for the child to explore	The child presses down the keys with various touch supported by the teacher with physical prompt. The child presses down individual notes and cluster of notes.	**P.2.A.1** The teacher supports the child hands over hand/ hand under hand to press down the keys with various touches (gently, soft, loud, strike the keys, hammering the keys and etc.)	1. Some children may not be able to tolerate input from a teacher holding their hand, in such case, the teacher should demonstrate first and then gradually introduce touch to allow ample time for the child to become ready to create sounds on the piano. 2. For children who	The child comes to appreciate that different physical actions will produce different quality of sound.	The child produces sound without physical prompt.

			the range of sounds they can make by playing the piano in different ways, such as striking the keys, pressing them down using one finger/several fingers/palm/arm/ elbow, or hammering the keys. The teacher can then expand this by exploring how different touches on the keys will produce different sounds.			are unable to tolerate the tactile experience of the piano's surface, the teacher can allow the child to hold and control the teacher's hand to create sounds on the piano and then gradually transfer it to the piano.		
2	**I.2.A**	Sounds made by another stimulate a response in sound.	The piano is used as resource to make a variety of sounds with the aim of generating responses from the child, which in turn leads to interactive play	The child is allowed ample time given time to respond to the teacher's playing. Similar to call and response.	**I.2.A.1** The teacher plays on the piano and allows ample time for the child to respond.	1. The teacher should first play the material as short as possible and allow ample time for the child to respond (wait at least 10 seconds) until another attempt.	The child learns interaction, taking turns in playing the piano.	The child is able to respond to the sound made by the teacher through different ways of playing (banging on the piano, pressing

			with the teacher.	The child may respond in different ways, such as using their facial expressions, body language, or vocalising.		2. Repeat the strategy several times to test that the child is reacting to the sound the teacher made and not random behaviour. 3. The teacher can then interaction with the child by providing appropriate response such as imitate the child's production of sound. This can then lead to turn-taking.		down the keys, knocking the keys etc.)
	I.2.B	Sounds are made to stimulate a response in sound by another	The piano is used as a resource to provide an appropriate response while the child intentionally made a sound on the piano, this can then lead to interactive play with the teacher.	The child makes a sound and pauses. The child may respond back in different ways.	**I.2.B.1** The teacher works under the assumption that the child seeks a response to the sound that they make and immediately provides an appropriate response.	1. The teacher can respond through imitating the sound in return (several attempts). 2. The teacher can then try to respond differently to observe if the child notices any different or if the child will react differently.	The child learns interaction, taking turns in playing the piano.	The child becomes aware that their actions can cause an effect and responds to the teacher through different ways.

3	**R.3.A**	Recognises and responds to the repetition of sounds	The piano is used to create patterns. The design of the piano, with its immediacy and consistency of sound, provides a particularly useful medium for direct repetition, and enables the child to recognise simple patterns that can be produced on the piano. This can be done through using sounds (pitches) or rhythmic patterns produced from the piano.	The child engages with a repeated sound that produced by the teacher. The sound may form a regular beat.	**R.3.A.1** The teacher starts to elicit responses from the child by playing sounds for which the child has previously shown a preference. This can be a particular note on the piano, or a cluster or notes, a chord. Once the child responds to the repetition in relation to the sounds of a particular quality, teacher may try to extend to other sounds, for example made by playing at different tempi, in different register at different	1. If the child shows dislike to the pattern, the teacher should change to another pattern. 2. This strategy should be maintained and repeated in various lessons to offer a wide listening experience for the child. The strategy is also used to show the child that various patterns can be made from the piano.	The child engages with a repeated sound that produced by the teacher. The sound may form a regular beat although may need not. This may lead the child to produce the sound through imitation.	The child comes to recognise structures in sound and is able to detect patterns in sound, potentially of various types.

					dynamics.			
3	**P.3.A**	Intentionally makes simple patterns through repetition.	The child starts to learn basic pitches on the piano and the geographical design of the piano (groups of two black keys and three black keys; and after every seven white keys, the pattern repeats itself). In order to enhance their recognition and to assist the child to remember, letters are attached to the keys to provide visual cues for the child. At this stage, no piano technique is involved; the piano is used as a resource to assist the child in	The child creates patterns (repeated notes) on the piano with the help of the teacher. The child creates simple patterns, same note up and down all octaves of the piano with the help of the teacher.	**P.3.A.1** The teacher uses visual labels to clarify the geographical design of the piano for the child. The underlying assumption is that the child has a basic comprehension of reading, such as the ability to read letters or numbers. The teacher points to the labels and names the keys. **P.3.A.2** The teacher supports the child physically by holding the child's hand or	1. Although the keys on the piano are conventionally named with letters, there are other ways, such as using numbers, colours, shapes to introduce patterns. 2. P.3.A.1 is not a standalone strategy, it should be used in combination with other strategies (P.3.A.2, P.3.A.3) to assist the child. 3. Possible materials range from repeated single notes or ascending and descending patterns of notes to intervals of notes and chords. 4. P.3.A.3 is used if tactile defensiveness precludes strategy P.3.A.2. 5. P.3.A.3 can be combined with the		

			recognising simple patterns on the piano. Recognising patterns is important in music making, as music (repertoire) is made up of patterns.		using hand-under-hand or hand-over-hand techniques to create simple patterns on the piano. **P.3.A.3** The teacher provides cues, such as pointing to or naming the keys, to direct the child to create patterns on the piano.	interactive strategy (I.3.B.1) in which the child learns to imitate patterns. Not every child immediately understands the concept of imitation, by providing visual cues, the teacher can help the child to understand the relation between cause and effect.		
	P.3.B	Intentionally makes simple patterns through a regular beat.	The child learns that with the same physical action (striking/playing the keys), they can form a regular beat on the piano.	Prompt by the teacher, the child plays simple patterns (repeated notes) on a regular beat.	**P.3.B.1** The teacher supports the child hand over hand/ hand under hand to repeat the notes with regular beat with counting.	1. If the child exhibits tactile defensiveness, the teacher can return back to strategy R.3.A.1 to create simple patterns with regular beats for the child to internalise and feel the beat before supporting them in playing the piano. 2. The teacher can	The child comes to appreciate that music is made up of pattern such as regular beat.	The child plays the piano creating simple patterns through a regular beat.

						provide accompaniment with regular beat to help in reinforcing the pulse while the child is playing.		
	P.3.C	Intentionally makes simple patterns through regular change.	Once the child has learnt that simple patterns (repeated) can be formed on the piano, the teacher can start introducing how regular changes can be achieved on the piano using patterns.	The child learns to play repeated ascending and descending pattern of notes (C, D, E, F, G, G, F, E, D, C) with regular changes such as playing in different registers and playing in different keys and play with alternate hands.	**P.3.C.1** The teacher uses simple patterns that the child already knows (e.g. repetition of notes, ascending and descending patterns, chords) and alters them by, for example, playing in different registers, in other keys, in higher or lower octaves or with an alternate hands. This strategy uses demonstration and holding the child's hand to assist in	1. Both strategies can be use alternately or combined. 2. These strategies are implemented once the child has recognised the ability to create basic patterns on the piano, only once the child grasps such understanding can the teacher proceed to the task of making simple patterns through regular changes.	The child comes to appreciate that music can make simple patterns through regular changes.	The child is able to play differemt patterns without the help from the teacher.

					learning. **P.3.C.2** The teacher provide visual cues i.e. pointing at or naming the keys to help the children play the correct keys.			
3	**I.3.B**	Imitates the sounds made by another.	The piano has the ability to illustrate clearly the cause–effect relation: pressing a key will always have the same effect. Thus, the piano is used as an instrument to initiate 'call and response' activities: the child learns to imitate simple patterns played by the teacher.	The child learns to copy the teacher's playing (short musical patterns), starts through physical prompting.	**I.3.B.1** The teacher initiates interaction by creating simple patterns, then pauses and waits for the child to imitate the same patterns in return.	1. This strategy can be used in combination with P.3.A.2 and P.3.A.3 to provide visual cues and physical support to help the child in developing imitation skills. 2. Please allow ample time for the child to respond. 3. It is noteworthy that approximate imitation may take place at first, wherein the child might imitate one accurate note or	The child learns to copy musical patterns. Enhance short-term memory.	The child is able to copy the teacher's playing without physical prompt.

						perform only a gesture of imitation.		
	I.3.C	Recognises own patterns in sound being imitated	Here, the teacher is seeking initiation from the child. Ideally, the teacher will become involved in the process of imitating the simple sounds produced by the child, to see if the child recognises that their own patterns of sound are being imitated.	Direct the child to play a musical pattern on the piano, the teacher copies and pauses to see if the child notices that her playing has been imitated.	**I.3.C.1** The teacher deliberately imitates what the child has played and pauses to see if he/she notices that his/her playing has been imitated.	1. It can be a complex process to understand the concept of imitation and become aware of one's own sounds being imitated for children with ASC, therefore, this strategy should be implemented repeatedly to support them in understanding the concept. Only through many repetitions of the process could the relation between cause and effect become apparent to the children.	The child learns interaction through music making.	The child is able to own patterns being imitated.
	I.3.D	Imitates simple patterns in sound made by another (through repetition,	The imitation between the teacher and the child continues; however, one should note that shared attention is	The child imitates simple patterns played by the teacher with regular changes such as playing in	**I.3.D.1** The teacher plays simple patterns for the child to imitate. The teacher may play	1. These strategies are implemented only when the child has gained the ability to imitate and create simple patterns.	The child learns interaction and recognises changes in pattern.	The child is able to imitate the teacher's playing without physical prompting.

		regularity and/or regular change)	a significant notion here. The attention of the teacher and the child should be attuned to each other, so that they can alternate their roles: the teacher demonstrates while the child imitates, or vice versa.	different registers and in different keys. The child plays simple patterns for the teacher to imitate with regular changes and/or repetitions.	accompaniment while the child is imitating the pattern. **I.3.D.2** The teacher imitates simple patterns played by the child, deliberate change patterns to see if the child is able to recognise the changes.			The child is able to play the simple repetitive patterns without being distracted by the accompaniment. The child is able to make repetitive patterns through regular changes with accompaniment by the teacher.
4	**R.4.A**	Recognises and responds to distinctive groups of musical sounds – 'motifs'	The child starts to learn to play short motifs on the piano. Again, the piano is not taught in the conventional way, by which techniques are dealt with first. Instead, music making is the	The child listens. The teacher is hoping to seek responses from the child. The child may wander off or show recognition/resp	**R.4.A.1** The teacher demonstrates playing a set of motifs on the piano and pauses between each one to allow the child to listen and respond.	1. The teacher should use materials (songs and pieces) that the child likes or familiar. It can be the short chorus of a song that the child likes. The teacher can sing they lyrics while playing to the child. 2. Allow ample time	The child recognises musical motifs.	The child comes to be aware that musical motifs can be played/created on the piano.

			priority: the teacher focuses on creating simple musical motifs for the child to listen to and enjoy.	onses through facial expressions, body language etc.		for the child to respond. 3. Once the child responses to the motif, perhaps stop singing and only play the motif on the piano to observe if the child reacts the same. 4. Repeat this strategy several times and provide a variety of genres and songs for the child to listen. 5. If the child feels distressed, stopped the lesson or take a short break before continuing.		
	R.4.B	Recognises and responses to musical motifs being repeated or varied.			**R.4.B.1** The teacher shows how motifs can be related (through repetition and variation) through 'call and response' activities,	1. This strategy is implemented only when the child is able to recognise musical motifs.	The child recognises musical motifs being repeated or varied. The child recognises a chunk of music being	The child comes to be aware of musical motifs being repeated or varied through responses such as body language, facial expressions or

					making the relationships as clear as possible, with a range of different materials such as a short phrase of a tune, a short chorus of songs etc.		repeated or varied.	vocalisation etc.
4	**P.4.A**	Creates distinctive groups of musical motifs	The child then continues to learn by creating groups of musical motifs on the piano. As mentioned above, music making should be prioritised; however, once the child is familiar with the materials, the teacher can then start introducing simple techniques to play these	The child learns to play motifs on the piano.	**P.4.A.1** The teacher supports the child by holding his or her hand or using the hand-under-hand or hand-over-hand technique to play the musical motif on the piano. **P.4.A.2** The teacher provides cues such as pointing	1. The teacher can use short motifs from the songs that the child knows or create short rhythmic motifs. 2. Repeatitive materials are encouraged as children with ASC are fond of repeated and predictable materials. 3. For children with tactile defensiveness, the teacher can change to strategy P.4.A.2 to support the child	The child comes to appreciate that music is made up by motifs.	The child is able to remember different groups of musical motifs and able to clap and play the musical motifs without the help of the teacher.

			materials.		to or naming the keys, to direct the child to create patterns on the piano.	in creating motifs on the piano. 4. The teacher can sing the short motif to the child (P.4.A.2) if the child has absolute pitch. Children with absolute pitch benefit from learning through imitation or 'rote learning'.		
	P.4.B	Links musical motifs by repeating or varying them.		The child learns to play motifs through repetitions and also variations.	**P.4.B.1** The teacher supports the child by holding his or her hand or using the hand-under-hand or hand-over-hand technique to vary or repeat the musical motifs. **P.4.B.2** The teacher provides cues	1. Once the child has learned to create musical motifs, the teacher can then proceed in teaching them to vary the musical motifs such as transposed to different keys, playing in different registers, playing with different dynamics and articulations.	The child comes to appreciate that music can be transposed and be played in different keys. The child comes to appreciate that motif can be varied through different ways.	The child is able to play different musical motifs through repetitions and also varying them in a number of ways.

					such as pointing to or naming the keys, to direct the child to vary or repeat musical motifs.			
4	**I.4.A**	Produces musical motifs in the expectation that they will stimulate a coherent response.	The piano is used for joint attention activities such as call and response. At this stage, the teacher is not seeking a direct imitation from the child; instead, she seeks responses from the child by playing half of the motif. The child may respond through facial expressions, body language (pulling the teacher's hand towards the piano as an indication to continue) or vocalisation. The child may also respond by	The child plays a set of musical motifs; the teacher will imitate in return and/or complete the rest of the repertoire.	**I.4.A.1** The teacher imitates the musical motif played by the child and/or completes the remainder of the piece.	1. Here, the teacher works on the assumption that the child is expecting a response from the teacher. 2. Since deficits in social interaction and joint attention are core aspects of ASC, it was common for children to be unaware that the teacher is imitating their sound. Repetition can improve this skill.	The child comes to appreciate that music making can be interactive through activities such as 'call and response'.	The child produces musical motifs in expectation that they will stimulate a coherent response.

			completing the rest of the motif.					
	I.4.B	Imitates distinctive groups of musical sounds – 'motifs' – made by others.	The piano is used for 'call and response' music making. At this stage, the child is learning to imitate the teacher. The child learns through demonstration and listening, instead of reading notation.	The child copies the teacher's playing through listening.	**I.4.B.1** The teacher plays motifs on the piano with several pauses for the child to imitate in return. **I.4.B.2** The teacher uses visual cues such as pointing towards the keys to help the child in imitating the accurate keys.	1. This strategy is particularly effective for children who have absolute pitch. Such children only need to reproduce the groups of notes that they hear and map them in relation to the given pitches on the piano. 2. For children who struggles to imitate, the teacher can change to I.4.B.2 to support the child in developing imitation skill. 3. These strategies can be combined with P.4.A.1 wherein the teacher supports the child by holding their hand to imitate the materials.	The child learns longer repertoire by introducing motifs with pauses. Enhance attention and memory skills.	The child is able to imitate distinctive groups of musical motifs.

	I.4.C	Responds to others by using different musical motifs coherently.	The teacher is seeking responses from the child, or recognition of the different motifs that are linked together.	The child completes motifs with the help of the teacher.	**I.4.C.1** The teacher deliberately plays incomplete motifs with pauses for the chidl to complete the rest. **I.4.C.2** The teacher uses visual cues, such as pointing to the keys to help the child start at the correct note.	1. This strategy can be used as a strategy to support the child to imitate material. As imitation skills are new and require a high cognitive and processing level, the short-term memory of some children may prevent them from imitating the full motifs. In such case, the teacher can help the child recognise the motif in parts. The teacher can then increase the length of the motifs until the child achieves an imitation of the full motif. 2. While the child struggles to remember the motif, I.4.C.2 is effective to help the children recognise which keys to start or play. This helps to promote memory	The child learns to listen attentively and responds to other's playing. Enhance attention and memory skills.	The child is able to complete the musical motifs played by the teacher without physical prompt.

						and learning of the material.		
	I.4.D	Interactions form coherent patterns of turn taking, with the possibility of some simultaneity.	This element corresponds with level 5, or is approaching level 5: the child is now learning to play the piano with extended materials, which leads towards playing simultaneously with the teacher.	The child plays the piece with turn-takings with the teacher.	**I.4.D.1** The teacher supports the child to take turns in playing motifs or they play simultaneously.	1. This strategy can be combined with any strategy of the above (P.4.A.1, P.4.A.2, I.4.B.1) to support the child in taking turns with the teacher. 2. One should note that this element approaches or corresponds to level 5 and that the teacher can start to support the child in learning extended materials moving to playing short simple pieces (level 5).	This strategy promotes integration between cognitive, motor and auditory processing. The child learns turn-taking, with the possibility of some simultaneity.	The child is able to pick up the phrase and play simultaneously with the teacher. The child is able to play pieces through turn-taking with the teacher.

5	**R.5.A**	Attends to whole pieces of music, becoming familiar with an increasing number and developing	The child is given opportunities to listen to various genres of repertoire. The teacher will start with songs that the child is	The child listens. The teacher is seeking growing concentration from the child	**R.5.A.1** The teacher starts with songs or pieces that the child listens at home or school and then seek to extend	1. The teacher can label the piece verbally or through other means, such as the use of PECS, to allow them to be referenced in future choice making.	The child is given the opportunity to listen to a broad repertoire of pieces.	The child listens to an increasing number of pieces all the way through and develop preferences.

		preferences.	familiar with, such as nursery rhymes, pop music, classical music or jazz. The teacher is seeking growing concentration from the child, whereby they are able to listen attentively throughout the entire repertoire or several repertoires.	where he/she is able to listen attentively throughout the entire repertoire or several repertoires.	the child's experience through exposure to wider repertoire, potentially incorporating pieces of growing length and complexity.		The child may become familiar with an increasing number of different pieces and develop preferences.	
	R.5.B	Recognises prominent structural features (such as the choruses of songs)	The teacher may deliberately play choruses or prominent features from the repertoires that the child is familiar with, to seek responses from the child.	The child listens to a wide variety of repertoires.	**R.5.B.1** The teacher deliberately plays choruses or prominent features from familiar songs to facilitate recognition.	1. Note that the child may express preferences verbally or convey through facial expressions or singing along with the teacher. 2. The teacher should use songs that the child has already demonstrated a preference.	The child becomes familiar with the prominent feature of repertoire of pieces (eg. **c**horuses of songs). The child develops	The child responds to the prominent features through different means (eg. facial expressions, verbally, singing etc.)

							preferences.	
5	**P.5.A**	Perform short and simple pieces of music, potentially of growing length and complexity, increasingly 'in time'.	The child is introduced to playing a full repertoire on the piano through demonstration or listening. Notation is not introduced at this stage. The materials are divided into smaller parts, to help the child to memorise the repertoire.	The child learns to play repertoire through different means.	**P.5.A.1** The teacher physically supports the child by holding his or her hand to learn the piece. **P.5.A.2** This strategy employs imitation, cues and prompting which are known as rote learning, wherein the teacher plays a short section and the child imitates it afterwards. **P.5.A.3** The teacher uses simple letter	1. These strategies can be combined or used alternatively to support the child in learning a repertoire. 2. The teacher should start with songs and pieces that the child knows or likes. If the child has no particular preference, the teacher can start with repertoires with repetitive materials: Twinkle twinkle little star,	The child learns to perform short pieces, potentially of growing length and complexity. Enhance memory skills.	The child is able to perform short pieces that have learnt previously without the help of the teacher. The child is able to play in time. The child is able to learn new repertoires through listening.

					notations and sticker labels on the piano. This strategy primarily employs visual modality to teach the child to play the piece by matching the letters on the score to those on the piano. **P.5.A.4** The teacher takes turn to play the repertoire with the child. The piece is broken down into several small sections.			
	P.5.B	Intentionally improvises on familiar pieces, varying the original	In this element, the child learns that materials can be varied in different ways, and learns the	The child listens to the teacher improvises on familiar pieces. The child is then encouraged to	**P.5.B.1** The teacher introduces transposition to existing	1. This strategy is only introduced when the child has learned to play a simple piece and is able to play the piece without	The child learns to improvise on original material.	The child is able to improvise on short pieces without the help of the teacher.

		material in simple ways.	techniques used to achieve this.	copy the same and improvise their own. The child is encouraged to play together with the teacher.	materials. **P.5.B.2** The teacher supports the child in improvising previously learned pieces. The teacher first introduces such improvisation through a demonstration before the child imitates the teacher in return. Once the child grasps the concept of improvisation, the teacher permits the chidl to improvise independently.	support. 2. Depends on the child's ability and interest, P.5.B.1 may be introduced first before P.5.B.2. 3. These two strategies can be combined with P.5.A.1, P.5.A.2, P.5.A.3 and P.5.A.4 to learn the transposed or improvised materials.		
	P.5.C	Creates short and simple pieces of music, potentially of	The child starts to learn, using ideas from the repertoire that they know, and	The child learns about ideas from songs that they have known.	**P.5.C.1** The teacher supports the child to		The child learns to create new short pieces using ideas from	The child is able to create and compose short pieces, potentially of

		increasing length, complexity and coherence, whose general characteristics may be intended to convey particular moods or feelings, and which may be linked to external associations.	will use their imagination to create their own composition on the piano. The teacher will provide guidance throughout.	The child creates sounds on the piano to portray certain characters, specific emotional intention etc.	compose short simple pieces by suggesting ideas. Teach about sounds that can be made from the piano to portray certain characters, moods and emotional intention.		songs that he/she has known.	increasing length, complexity and coherence.
	P.5.D	Has the physical capacity to produce short and simple pieces of music, potentially evolving to meet the needs of material of	The child learns piano techniques (execution of fingers, learning to play with good support of both arms and hands). The child also starts learning simple musical concepts.	The child works on techniques such as learning coordination of hands by playing hands together for different repertoires. The child learns to playing major	**P.5.D.1** The teacher introduces a variety of piano techniques. The teacher uses demonstration rather than explanation since some children with ASC have	1. This strategy can be used in conjunction with P.5.A.1, P.5.A.2 or P.5.A.3 – respectively, the hand-under-hand technique so that the child can feel the movement, visual prompts through which the child can visualise the correct	The child learns advanced techniques in order to play more advanced pieces.	The child is able to play more advanced pieces with both hands. The child is able to master most of the techniques.

		growing complexity and length.		and minor scales with both hands and alternating hands. The child is given different exercises to be played on the piano, e.g Hanon.	difficulty with comprehending complex musical concepts and instructions.	keys to play and visual labels by which the child can visualise and match the correct letter notations to the correct keys on the piano – or with a combination of all three. 2. While teaeching scales, the teacher should start with simple 5 finger exercises and then slowly expand. 3. The teacher should prepare to modify fingerings in technical exercises to adapt to the child's learning needs.		Good memory skills.
5	**I.5.A**	Perform simple pieces simultaneously with others, sharing a common	Ensemble skill is important in music making. It is an essential skill for a musician to be able to play in	The child play simultaneously with the teacher. Two children play same repertoire	**I.5.A.1** The teacher supports the child to play simultaneously with others, introducing	1. This strategy can be used in conjunction with other strategies, such as P.5.A.1 or P.5.A.2 to support the child in playing	The child develops ensemble skill to perform simple pieces with peers.	The child is able to perform simultaneously with others, sharing a common part.

		part.	time and in tune with other musicians. In this element, the child learns to develop ensemble skills through performing or playing simultaneously with others. Through this method, the child will learn to interact with others through music. This skill is first introduced by playing a common part with the teacher; this will assist the child to become familiar with the skill of playing in time with others.	together. The children are introduced to simple duet skill and have enjoyment in playing with peers.	ensemble skill.	accurately and in time with others. 2. The teacher should use pieces that the child had learned previously. 3. If the child seems to be having difficulty in playing simultaneously with others, provide gradual scaffolding, from playing together on one bar and then slowly increase to a full repertoire.		
	I.5.B	Perform with others, using increasingly	Having accomplished the above, the child is	The child plays an entire piece with teacher or	**I.5.B.1** The teacher provides	1. The primary challenges are working together	The child devlops ensemble skill	The child is able to perform together with

		developed ensemble skills and maintaining and independent part.	then introduced to playing with others by maintaining his/her own independent part. As this is a challenging skill, the teacher may start by playing a common part with the child while providing simple accompaniment at the same time, before letting the child play his/her own part completely.	other peers playing accompaniment or second part of the duet.	accompaniment or similar support as the child plays the melody, or the teacher plays the second part of a duet with the child.	and making decisions while using little or no language as well as the difficulty of comprehending musical instructions. 2. In this case, it is important for the teacher to scaffold the child by playing together with the child to impart appropriate skills, such as the ability to play in time with others and maintain an independent part without disruption, as well as sensitive listening and cooperation skills. 3. The teacher can first take the dominant role in leading the child while playing together before gradually transferring control to the child.	and ability to perform with others.	the teacher.

	I.5.C	Improvises with others, repeating, varying and/or building on the material that is offered in simple ways.	At this point, the child has already been introduced to playing a wide variety of repertoires and is comfortable playing with others. He/she can start improvising on their own independent parts while the teacher provides accompaniment.	The child is encouraged to improvise on materials that have learned and playing together with the teacher.	**I.5.C.1** The teacher introduces improvised materials with adequate support, such as by demonstration or use of the hand-under-hand or hand-over-hand technique while playing with the child at the same time.	1. If the child possesses absolute pitch, the teacher can guide him or her by singing the improvised materials and subsequently playing them on the piano. 2. The teacher can then encourage the child to further develop materials through independent improvisation. 3. The teacher should constantly observe the child's actions, be flexible in changing the strategy and permit the child to lead the session when necessary.	The child develops improvisation and ensemble skill at the same time.	The child is able to improvise materials together with the teacher.
	I.5.D	Improvises with others, and offer material for them to use. Joining other	The child has developed good musical skills that allow him/her to improvise and play in an	The child is introduced to play with other instruments such as violin, cello, flute and etc to	**I.5.D.1** The teacher provides support for the child to play in an		The child develops ensemble skill and confidence in playing with others	The child is confident in playing with others in ensemble group.

		ensemble group.	ensemble group.	expose vast variety of ensemble experiences.	ensemble group with other instruments.		independently. The child develops good listening skill by playing with others.	