

## 10 Music technology and special educational needs

### A novel interpretation

*Evangelos Himonides and Adam Ockelford*

The advent of various technologies and technological modalities has, naturally, affected music education, and the way that teachers engage, challenge, and support music students in their musical development. However, it appears that some teachers tend to have a limited view of technology and music, and there is a sense that it would be beneficial for them to see the bigger picture of the potential role of music technology within educational contexts (Himonides 2012a, 2012b; Himonides and Purves 2010). Ironically, the music-educational avenues that technology opens up are wider than ever before, and the distinction between formal and informal learning is becoming increasingly blurred, with the two existing on a fuzzy – if rich – continuum of educational opportunities.

It seems that a particular challenge is that pedagogical development is often driven by manufacturers rather than being initiated and directed by teachers themselves, nor is it based on a critical assessment and understanding of the educators' own needs and aspirations (Himonides 2012b; Purves 2012; Savage 2012). As a result, teachers are often made to feel reliant on particular tools and technological solutions (what the manufacturers and the extended industry wish to sell to them and their schools). This tool-centric *modus operandi* presents a threat to music education, as Himonides (2016) argues, constraining educators' capacity for reflective practice and making it difficult for them to foster their students' learning and development in creative ways. Music educators' concerns about their practice often pertain to their capacity to use particular software packages (such as Sibelius, Logic, Cubase) and items of hardware (including iPads, proprietary recording and audio interfaces, keyboards, and other MIDI devices).

Similar challenges exist at the intersection of music, education, therapy, and learners with special needs. Although technological developments are continually introducing exciting possibilities for those working in music-therapeutic and special-educational contexts, there tends to be the same focus on the role of 'the tool' itself, rather than looking first at the child and his or her needs and abilities. Particular tools – soft or hard instruments and devices are often presented as 'golden calves', essential to the success of particular music-therapeutic or music-educational interventions. Similarly, in academia, we encounter reports on 'the use of . . .', 'application in . . .' and 'benefits of . . .' given tools in certain contexts, often with little or no assessment of how effectively these tools had

actually been used. We seldom find critical studies centring on the understanding of how musical development unfolds, how musical behaviours and musical experiences can be classified, and what the role of technology could be within this dynamic taxonomy. Undoubtedly, particular tools (and tool types or tool 'classes') will have a crucial role within this taxonomy, once it is developed. But it is important to focus on understanding first, before shifting the focus onto the tools themselves.<sup>1</sup>

Such an endeavour is evidenced by the Sounds of Intent project, details of which are presented below. Sounds of Intent constitutes a systematic attempt to map, gauge, and foster musical development using technology. It also presents a unique case of a research-focused exercise within the field of special educational needs that has become the springboard for the development of a similar scheme pertaining to children in the early years of education. Sounds of Intent offers an unusual example of the multidimensional role of technology, providing the wherewithal not only for structuring the understanding of children's musical development, but also as a means of presenting how musical development can be fostered using appropriate technological tools effectively.

## **Background**

In 2000, Adam Ockelford produced a position paper concerning the knowledge and understanding of the provision of music education and therapy for children with complex needs in the UK. This led to the development of a new conceptual framework for practitioners, parents, and teachers working in special needs, and set out suggestions for further research. A number of initiatives followed, including a survey of the music offered in special schools in England (subsequently known as the 'Promise Report' [Welch, Ockelford, and Zimmermann 2001; see also Ockelford, Welch, and Zimmermann 2002); a doctoral thesis by Markou at the University of Roehampton examining the relationship between music education and music therapy for pupils with learning difficulties (Markou 2010; see also Ockelford and Markou 2012); and the establishment of the Sounds of Intent project, whose initial aim was to map the musical development of young people with complex needs (see e.g. Cheng, Ockelford, and Welch 2009; Ockelford and Matawa 2009; Ockelford et al. 2006; Welch et al. 2009).

In the course of the Sounds of Intent research, various ways of depicting putative music-developmental trajectories visually were considered, with the aim of making these readily accessible to teachers. A key consideration was to represent the notion that one developmental stage builds on those preceding without replacing them. The team also wanted the framework to give a general feeling of growth and expansion – of moving out into the world from an inner core. After several attempts, an approach was adopted that used segments within concentric circles (Figure 10.1). This model, including refinements to the wording, emerged over a two-year period (July 2003 to August 2005) in the light of iterative, group-based analyses of video-recorded case-study data from many children with severe or profound and multiple learning difficulties in different schools.

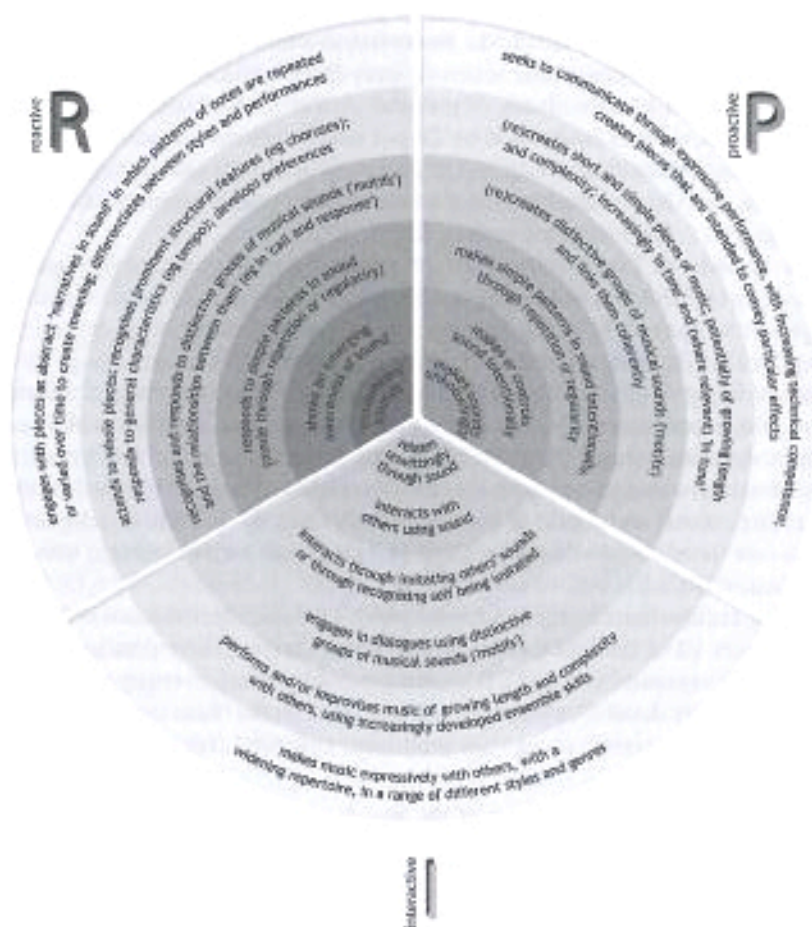


Figure 10.1 Sounds of Intent framework

Upon completion of this mapping exercise, the research team shifted their focus to the design and development of a web-based resource through which the developmental framework would become openly accessible and permit relevant data and illustrative media (videos) to be mapped onto it. The aim was to enable practitioners around the world: (1) to assess the musical engagement and developmental trajectories of children and young people with complex needs, (2) to perform longitudinal assessments of the young people's development, (3) to augment their longitudinal recorded assessments and observations with qualitative data, (4) to access annotated videos in order to be able to compare and contrast their own observations with those of other practitioners and carers, (5) to access all of their pupils' and students' developmental data in a secure, central location, and (6) to share their experiences, engage in critical discourse, and network with other

practitioners. A series of research-driven exercises led to the development, by the first author, of the Sounds of Intent online portal, which was officially launched to the public in February 2012.<sup>2</sup> In the two-and-a-half years that followed, the Sounds of Intent online portal received over three million unique visits, with almost half a million downloads of material. At the time of writing, the Sounds of Intent resource was being used by 20 per cent of special schools for children with learning difficulties in England, with nearly 500 practitioners registered on the system, who had created profiles for nearly 2,000 young people with complex needs, in over 5,000 electronic session forms.

The Sounds of Intent framework of musical development covers musical engagement by children and young people with a wide range of musical abilities, ranging from those who show no response to sound to those who demonstrate exceptionally highly developed skills. Hence the framework covers a huge developmental range. This is partitioned into six theoretical stages of musical development, which correspond to core perceptual and cognitive abilities within each of three domains, termed 'Reactive' (how one responds to sound and music; R), 'Proactive' (how one creates sound and music oneself; P), and 'Interactive' (how one creates sound and music in the context of others; I). The six developmental stages – or 'levels' – are shown in Table 10.1; they can be remembered using the mnemonic CIRCLE.

Having six levels across three domains yields 18 'headlines' of musical development (Figure 10.1). Each of these is broken down into four more detailed descriptors termed 'elements' (A, B, C, D), setting out what musical engagement might look like in more detail. For example, the fifth level on the 'Reactive' domain (R5) 'attends to whole pieces: recognises prominent structural features (eg choruses);

*Table 10.1* Further conceptualisation of the Sounds of Intent framework (Vogiatzoglou et al. 2011)

<i>Level</i>	<i>Description</i>	<i>Core cognitive abilities</i>
1	Confusion and Chaos	None: no awareness of sound as a distinct perceptual entity
2	Awareness and Intentionality	An emerging awareness of sound as a distinct 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 aspects of sounds
4	Sounds 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 of the frameworks of pitch and perceived time that lie behind them
6	Mature artistic Expression	A developing awareness of the culturally determined 'emotional syntax' of performance that articulates the 'narrative metaphor' of pieces

responds to general characteristics (eg tempo); develops preferences' and is broken down into the further four descriptors as follows: 'attends to whole pieces of music, becoming familiar with an increasing number and developing preferences' (R5A); 'recognises prominent structural features (such as the choruses of songs)' (R5B); 'responds to general characteristics of pieces (such as mode, tempo and texture)' (R5C); responds to pieces through connotations brought about by their association with objects, people or events in the external world (R5D). These additional four descriptors are not necessarily hierarchical.

## **The Sounds of Intent online resource**

### *The framework*

From the beginning, the Sounds of Intent team's intention was to produce something that would be intuitive for teachers, therapists, parents, and carers – who were not likely to be music specialists – to use. When the content of the framework was finalised, the development team focused on creating a user-friendly digital equivalent of the initial paper version of the scheme, in which the three domains (Reactive, Proactive, and Interactive) were assigned the colours red, blue, and green, respectively. Initial versions were trialled on personal computer platforms, and early iterations of tablet computers (laptop computers with collapsing and/or pivoting screens that could be used with proprietary styli for note taking). The team's aspiration was to be able to use the technology on keyboard-free portable devices; subsequently, the iPad and comparable touch-screen tablets enabled this aim to be realised.

### *The platform*

The Sounds of Intent materials were intended to be as inclusive, accessible, and inter-operable as possible. For this reason, the team decided against the development of a stand-alone software application that would have to be installed on teachers', therapists', and carers' personal computers. A web-based solution was therefore sought, through which all materials could be hosted centrally and users could always access the current version of the Sounds of Intent resource without concerns about software updates or whether their personal computers met the technical requirements for the installation of proprietary software. This decision presented some issues, namely the need for practitioners to have a live connection to the internet in order to access the resource, the complicated layers for safeguarding security, issues of intellectual property and copyright that the team had to institute in order to maintain a healthy online presence, and the continual development challenges presented when maintaining an online, dynamic (i.e. database-driven) resource that provides secure access to a large number of users, and that must be fine-tuned in order to guarantee sensitive data recording and retrieval. The Sounds of Intent resource currently provides access to over three hundred digital video examples.

At its core, the Sounds of Intent platform shares fundamental code blocks with one of the popular, open-source, collaborative, online, content management system platforms. On top of the core code layers, the development team has built the final interface with a particular focus on accessibility and interoperability (Bonacin et al. 2010), as outlined by the World Wide Web Consortium's Web Accessibility Initiative and the now completed Website Accessibility Conformance – Evaluation Methodology version 1.0 (WCAG-EM).<sup>3</sup> The WCAG-EM describes an approach to evaluating how websites, including web applications and websites for mobile devices, conform to Web Content Accessibility Guidelines 2.0 (WCAG).

### *What the platform offers*

The Sounds of Intent platform has been developed in order to fulfil the objectives presented in the introductory section, namely:

*To assess the musical engagement and developmental trajectories of children and young people with complex needs*

Practitioners can simply use the Sounds of Intent online resource in order to gain greater understanding about the person with whom they are working and how their behaviours could be mapped onto the Sounds of Intent developmental framework. All core components of the framework (the six levels inside each domain), as well as the extended elements are presented in an intuitive manner, accompanied by fully annotated headings such as a 'general observation' and an 'interpretation'. Furthermore, each of the extended elements A, B, C, and D is presented with more detailed observations as well as suggested strategies for practitioners to adopt.

For clarity, we present P3 (Proactive, level 3) 'makes simple patterns in sound intentionally, through repetition or regularity' as an example:<sup>4</sup>

#### GENERAL OBSERVATION

The key here is the intentionality behind the pattern that is made – for example, children and young people may produce a regular beat without being aware of it through motor activity that is not driven by sound. Intentionality can be gleaned through repetition or regularity that occurs in the wider context of variation, or through the alignment of what is achieved through external patterns.

#### INTERPRETATION

The child or young person can process and reproduce the basic forms of pattern in sound that underlie all music.

#### P3A: INTENTIONALLY MAKES SIMPLE PATTERNS THROUGH REPETITION

*Observation* Children and young people intentionally produce patterns of sounds through repetition – vocal or 'external'. Intentionality in the repetition may be

ascertained through the capacity of the child or young person to produce different sounds. For example, on a keyboard, a certain note or notes may be repeated in the context of variation.

*Strategies* Encourage or model repetition through means which a child or young person can already produce a variety of sounds (vocally or using a sound maker). Recognise and reward repetition that is produced (for example, through praise or imitation)

P3B: INTENTIONALLY MAKES SIMPLE PATTERNS THROUGH A REGULAR BEAT

*Observation* Children and young people intentionally produce a regular beat, potentially through a variety of means. Intentionality is the critical factor here, and this can be judged by potential or actual variability.

*Strategies* Encourage or model a regular beat through making sounds which the child or young person is known to enjoy. Reinforce production through praise or imitation.

P3C: INTENTIONALLY MAKES SIMPLE PATTERNS THROUGH REGULAR CHANGE

*Observation* Children and young people intentionally produce regular change in pitch, loudness, timbre, or to the beat. Changes may occur in isolation or combination.

*Strategies* Encourage or model regular change using sounds which the child or young person is known to enjoy. Reinforce production through praise or imitation.

P3D: USES SOUND TO SYMBOLISE OTHER THINGS

*Observation* Given the opportunity, children and young people use sound to symbolise other things. They may use different sounding objects to choose between activities, for example.

*Strategies* Once a child or young person recognises the symbolic meaning attached to a particular sound, he or she can be encouraged to use this proactively: to communicate decision-making, for example. Use sounds and meanings that the child or young person finds appealing, that they will be motivated to communicate about.

*To perform longitudinal assessments of the young people's development*

Upon creating a personal account and registering their details with the Sounds of Intent system, practitioners and carers are able to create online profiles for their pupils. The Sounds of Intent database does not record, require or accept pupils' names, addresses or any other personal information that could help identify the individual concerned.

In order to research and monitor development and also maintain a meaningfully coded research database, the following information is recorded:

- pupil's alias (the pupil's real name is known only to the registered practitioner)
- pupil's date of birth
- pupil's ethnicity
- pupil's sex
- pupil's special needs
  - cognition and learning needs specific learning difficulty (SpLD)
    - moderate learning difficulty (MLD)
    - severe learning difficulty (SLD)
    - profound and multiple learning difficulty (PMLD)
  - behaviour, emotional, and social development needs
    - behaviour, emotional, and social difficulty (BESD)
  - communication and interaction needs speech, language, and communication needs (SLCN)
    - autistic spectrum disorder (ASD)
  - sensory and/or physical needs visual impairment (VI)
    - hearing impairment (HI)
    - multisensory impairment (MSI)
    - physical disability (PD)

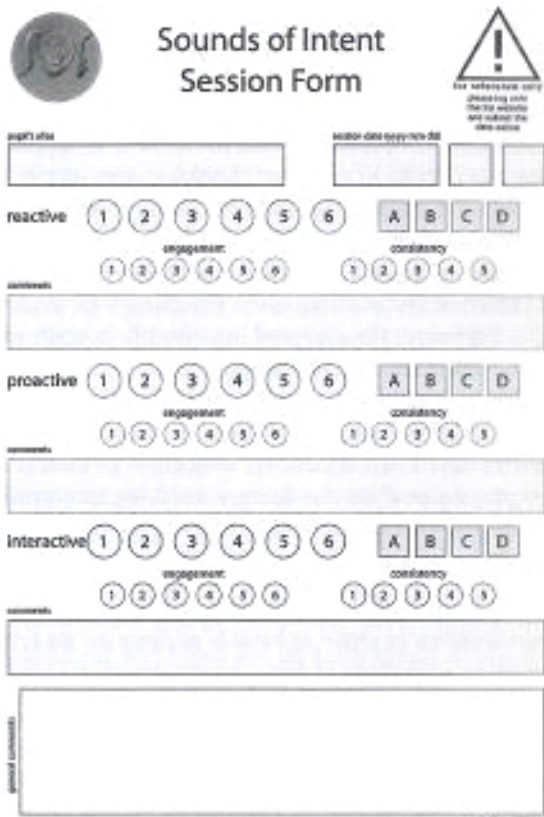
It is often necessary to assign multiple special needs or disabilities to individual pupils; this is something that the Sounds of Intent database schema fully supports.

Once the pupil's details have been recorded, the practitioner can record session observation data onto the Sounds of Intent system using a dedicated data-entry form (see Figure 10.2).

*To augment their longitudinal recorded assessments and observations with qualitative data*

The session-data recording form allows practitioners to add narrative to their quantitative assessment for a given session with their pupil. They are able to do so under each domain, recording pupil's reactivity, proactivity, and interactivity, as well as general remarks that are not domain-specific. For example, young people with profound disabilities may experience seizures or be affected by new medication, issues which are likely to have an impact on their participation during a given music session. Over time, practitioners can create and view a developmental profile of their pupils, print longitudinal graphs of their progress, and compare notes regarding their pupils' finer behaviours through particular observation windows.





**Sounds of Intent Session Form**

**For reference only**  
Please ring into the office whenever you return the data sheet.

reactive (1-6) (A-D)

engagement (1-6) consistency (1-5)

proactive (1-6) (A-D)

engagement (1-6) consistency (1-5)

interactive (1-6) (A-D)

engagement (1-6) consistency (1-5)

Figure 10.2 Session-data recording form

Some examples are offered below:

RJ singing along with guitar and vocal – joining in with co-worker and singing in context! RJ out of chair and relaxed. RJ recognising different music and listening to known different music – from rock to bhangra to classical. Some vocalisation observed over certain music – but still seems overwhelmed by noise. Recognises song structure and joins in with co-worker, sings with seeming knowledge of song structure and pitch required. Emulates co-workers pitch. Video evidence. RJ is showing increasing recognition of different ‘song’ structures and different pitches. RJ working well with ‘joining in’ another performer and structuring voice to match pitch/rhythm and structure of others playing. Video evidence available.

FM seems to recognise outside environment and seems to enjoy different environment. Still restricted in willingness to perform? Outside session – FM seems comfortable in different environment and less distracted than others in

group. Reacts in similar way to sounds played – less hearing difficulties than others in group? FM still rubbing drum – allowed drum to be placed on knees without refusal, rubs skin and creates some sound. Outside session seemed comfortable and not as distracting as for others in group. FM comfortable with others around.

Making sounds when presented with the activity of tap/clap and given the opportunities to vocalise in response. Looking over as tap clap was played with another child to request her interest. Looked over at me as the sounds were played and when another student was having their turn.

Using eye gaze to control eye gaze midi thing with squares. Made clear choice that preferred one with squares. The change he made was to slide up and down the keyboard. He explored note length as well; responding to the sliding sounds. Smiled each time that he did this.

N's confidence is growing through each session. He beginning to sing (albeit quietly) to all the songs and when it is his turn to do a solo or lead he will stand up and often dance. He continues to inform children if they shouldn't be playing or if they're doing something incorrectly. He is following my instructions well so I do not have to repeat myself. He is also beginning to keep a regular beat.

*To access annotated videos in order to be able to compare and contrast their own observations with those of other practitioners and carers*

The Sounds of Intent online resource offers access to over three hundred video recording segments. The digital video-file corpus is hosted on a leading video streaming technology (Vimeo), thus enabling a large number of digital videos to be made available in multiple versions to those who use the resource, depending on their internet connection speed and preferred device. This way, practitioners and carers can access a version of the video that they wish to review without concern for the speed of their internet connection, making it even possible for videos to be accessed on mobile telephones using 3G or 4G cellular networks. Furthermore, each of the continually augmented number of videos available to Sounds of Intent users has been annotated, permitting users to compare, contrast, and identify with specific pupil 'cases', learning contexts and musical experiences.

Some examples:

R4C – Romy's father plays two motifs coherently at the piano, an ascending chromatic scale that transitions into a theme from Aaron Copland's 'Rodeo'. As Romy hears and recognises the juxtaposition of these motifs, she shakes her hands in excitement and laughs. Romy also plays these motifs on the piano, combining them coherently (P4C).

P5C – Michael is thirteen years old. He has absolute pitch, an extremely good musical memory, is able to remember tunes he's heard before in the right key, and can create his own tunes and improvise on them. He has taken the Associated Board Preparatory test. Music is a very important part of

Michael's life. In this clip, Michael is playing, from memory, a piece he previously composed for the piano, in which there are different variations of the main melody. Only one variation is shown here. He also plays in different keys and with further variations of the melody. He plays this piece, maintaining his part, while being accompanied by the music therapist (also 15B).

11A – As Matthew vocalises his teacher responds empathetically, imitating his vocalisation as well as expanding on it. Mathew's repeated vocalisation, after he has heard the teacher, also indicates that he vocalises in response to what he hears (12A), demonstrating that his level of musical development lies at and between both Levels 1 and Levels 2 of the Sounds of Intent framework.

12A – Aisha is thirteen. She loves music, particularly playing the drums and has a good sense of rhythm. She often appears to switch off in class only to show that she has absorbed the content of the lesson, for example, later singing a song. As far as is known, this was the first time that Aisha was presented with a keyboard in this context. On being presented with the keyboard she spontaneously began to play. Aisha pauses during her playing, but comes back to it by hearing and turning towards the sounds made by the teacher, demonstrating that she is responding to the sounds she hears. She produces pure sound for sound's sake, rather than responding in imitation.

14B – This is a mixed ability class group, ages sixteen to eighteen, in their regularly weekly music lesson. They have been playing drums throughout the term in different ways and are learning about Africa in world studies. The class has been playing simple rhythmic patterns which they have been practising over a few weeks. Here Laura and Nancy are drumming a simple rhythm and an underpinning regular beat. An interaction between the two can be seen here as Laura (seated to the right) watches and listens to Nancy, using imitation in playing and maintaining the pattern.

These examples offer evidence of the work vested in Sounds of Intent by the core team and the wider group of collaborating practitioners, not only into capturing these 'windows' onto musical interventions, but also by providing key information in informing viewers of the significance of each video, which may not be immediately apparent in the case of children with profound levels of disability. This is something further underpinned with the provision of indicators pointing to the Sounds of Intent framework that accompany each individual video. Although the corresponding videos for each part of the Sounds of Intent framework are accessible from within the main framework navigation system (see below), they can also be accessed as a complete list on a dedicated video section.<sup>3</sup>

*To access all of their pupils' and students' developmental data in a secure, central location*

The Sounds of Intent online resource enables information on children's musical development to be held centrally, without the need to maintain localised files on different computers, and in different classes, schools or other venues. This is

particularly useful for practitioners who support young people with special needs within a number of schools or privately. It is, of course, possible for registered practitioners to download their complete recorded datasets for any registered pupil. Instructions are available on the Sounds of Intent website both in textual as well as video format. This has been reported as a valuable option for those practitioners who are required by their schools, local authorities or other funding bodies to maintain assessment data that are compatible with 'P-Scales'.<sup>6</sup>

*To share their experiences, engage in critical discourse, and network with other practitioners*

One of the key messages emerging from practitioners' feedback online and at conferences and public presentations is that before becoming engaged with Sounds of Intent they often felt isolated and in doubt about whether their assessments, strategies, and practices were systematic and similar to those of other practitioners in the field. Sounds of Intent has been supporting special needs practitioners in developing a sense of community, online as well as in person, during numerous dissemination activities for which the core team has received funding since the online resource's official launch.<sup>7</sup> Furthermore, and upon request from a large number of registered practitioners for providing a practical 'bridge' between the P-scales and the Sounds of Intent framework, Ockelford published a research-focused paper titled 'Comparison with the "P-Levels" for Music' (2012). This document highlights both the inefficiency of the P-levels as well as the pliability of the Sounds of Intent framework to provide meaningful information micro- and macroscopically. It therefore did not come as a surprise when Britain's Office for Standards in Education, Children's Services and Skills<sup>8</sup> (Ofsted 2012) included Sounds of Intent in a 'good practice case study' conducted at Whitefield Schools and Centre in East London.

### **Navigating the framework online**

Probably the most important part of the Sounds of Intent website is the provision of information, interpretations, strategies, and ways of assessment within the different domains, levels, and sections of the theoretical framework, as presented earlier. The design and development ethos has been to attempt to continually maintain a focus on the Sounds of Intent framework itself whilst a user navigates the information available. Early piloting and user surveys suggested that users wanted to 'always know where they were on the "dartboard" [the graphical representation of the Sounds of Intent theoretical framework as concentric circles]'. Various techniques were employed during the earlier design phases, including the use of different coloured text and text background (according to the dedicated colours for the three distinct domains) without great success. Finally, the team developed a floating navigation panel that would 'follow the user' (i.e. remain within the visible computer screen real estate) on the right-hand side. This special panel (see Figure 10.3) includes a miniature version of the Sounds of Intent graphical framework, where all

**You are here****Navigation****Session**

Figure 10.3 Online framework navigation panel (user is in R5)

segments besides the one that the user is focused on appear to be more translucent, therefore continually reminding the user about the framework topology and where they are within it.

Continual piloting of the navigation technology helped the team identify the importance of being able to meaningfully navigate across the different domains, levels, and elements. This led to the addition of navigation shortcuts to the floating panel. These shortcuts enable users to incrementally advance or retract the musical development related information across the domains (for example, a user in P3 will be directly navigated to P4 or P2 by using the '+' or '-' shortcuts, respectively). The shortcuts also provide the means for automatically placing the user's

focus on the four different elements (A, B, C, D) within the domain and level that they are already in (the highlighted segment of the mini framework [see Figure 10.3]). Therefore, if, for example, a user is accessing information in R5C and clicks on the 'a' shortcut on the floating panel, they will be automatically navigated to the beginning of R5A without having to provide any other information. Finally, the same principle follows assisted navigation across the three different domains. A user accessing information within I4 will be automatically navigated to R4 or P4 if they click on the 'R' or 'P' shortcuts, respectively.

### *Additional resources*

Within each level and element of the Sounds of Intent framework, visitors are provided with meaningfully selected resources and materials that could support their sessions. These include music / accompaniment scores, practitioner word cards and chord sheets, audio recordings, MIDI file versions of the audio recordings, notation files (Sibelius format), and pointers to particular book sections. A fully annotated list of the suggested readings is available on the Sounds of Intent website.<sup>9</sup>

### **Future developments**

There are over three hundred logged requests for future development 'wishes' from practitioners currently registered and engaging with the Sounds of Intent platform internationally. This is a testament to the enthusiasm, dedication, and critical thinking, that special needs practitioners and carers possess, as well as their real need for such a resource in the field.

Overall, the development 'wishlist' can be broadly categorised as follows:

#### *Video uploading / evaluation / voting / sharing*

Users would like to be able to upload their own videos onto the platform. At the first instance, in order to enrich their own pupils' portfolios of developmental data, but also, at a later stage, to be able to share those videos with the wider community. This feature is of top priority for the development team, although major challenges exist, such as confidentiality, security, copyright, data integrity, and validity. Ideally, users should be able to upload their own video, choose whether the video should remain private and solely connected to a student's profile, or whether it should be considered for becoming part of the extended Sounds of Intent video database. In that case, practitioners should be able to provide copyright release and ethics information and also some explanatory text that would make the context clear to other viewers. Finally, practitioners should be able to specify where on the Sounds of Intent framework of musical development the video belongs. This should be open to receive popularity ratings from other registered practitioners, thus enabling the practitioner community to scrutinise individual assessment and render the gradually expanding video corpus increasingly valid and robust.

### *User profile editing*

At the time of writing, practitioners were not able to edit recorded pupil and session data. This is an important functionality, an initial pilot for which has started, so that the development team can assess the caveats and potential threats to the validity and robustness of the overall database.

### *Class addition to database schema*

One thing that the development team had not initially anticipated was the overwhelming response that the online resource would receive. Amongst the groups of registered and active practitioners, cases exist where certain practitioners oversee large numbers of young people with special needs (in some cases over 40) in multiple locations. Therefore the need exists for the alteration of the existing, highly complex, database schema and incorporation of pupil classes, groups, and subgroups. Longitudinally, this might also lead to new research findings about commonalities or diversities in developmental patterns within different groups, special needs, other demographic classifications, and practitioners.

### *More sophisticated longitudinal statistics*

The Sounds of Intent resource provides a basic set of statistical graphing tools focusing on the longitudinal mapping of development (on the Y-axis) across time (on the X-axis) for all three domains. Practitioners were also able to plot longitudinal developmental trend lines, for any given time window, computed from the R, P, and I scores. Although this type of longitudinal statistical charting has proven to be very popular with practitioners and was further scrutinised during systematic research focusing on the assessment of the validity of the framework (see e.g. Cheng, Ockelford and Welch 2009; Markou 2010; Ockelford 2013; Ockelford and Markou 2012), the team felt that a new method of longitudinal statistical charting was required. The team wanted to somehow demonstrate that in a highly complex context, such as SEN, a series of 'scores' is something rather too narrowly focused compared with a 'developmental profile'. Various attempts to cater for this resulted in the piloting of novel charting using the complete graphical Sounds of Intent framework as the overall focus, whilst varying how opaque/translucent the individual segments appear, based on frequency of appearance (that is, how many times a pupil had been given a particular R, P, or I score within a given time frame).

The findings of this research were presented in 2012 (see Welch et al. 2012) and form the basis for future developments in statistical charting and developmental profiles and trajectories for Sounds of Intent pupils. More particularly, an analysis of the distribution of the teachers' observational assessment data revealed a wide diversity of musical behaviours in their pupils, but with no significant gender or ethnicity differences. However, analysis by SEN categories suggested that there may be characteristic differences in these group's music behaviour profiles, related

to the nature and severity of the disability. Nevertheless, it was extremely rare for any child not to demonstrate some form of engagement with music. Overall, the research indicated that the Sounds of Intent developmental framework was already beginning to assist participant teachers in improving the range and quality of their music education activities. It was also found to be a useful research tool as it will facilitate the building of a much more detailed and complete picture of the nature of musical behaviour and how it can be nurtured and developed for all children.

### *Classification of software and mapping onto the framework*

A common request from Sounds of Intent practitioners has been for the inclusion of a dynamic annotated map of relevant software applications (programs, apps, and utilities) and assessment on where and how they could be used within the overall framework. The first part of this complex exercise has already begun, with help from special needs practitioner and experienced Sounds of Intent clinician Victoria Hubbard. Following this initial map of software and affordances, the team is currently researching the development of a new taxonomy of music technologies within special needs, in order to support practitioners and foster greater flexibility and freedom in the incorporation of technological tools in the special needs musical plateau.

### **Conclusion**

The Sounds of Intent framework and related technologies have been presented in support of our argument that it is important to focus on understanding technology and its role within special needs education first, before shifting the focus onto the tools themselves. Existing and present research evidence from a range of linked studies indicates that the Sounds of Intent framework, being grounded in the rigorous study of a very large number of individual pupil cases, is an appropriate means for tracking musical development in children and young people with complex needs. The latest research suggests that practitioners in the special school sector are able to use the web-based Sounds of Intent technology intuitively in order to track the musical activity of their individual pupils and that this technology is also a useful research tool that can be used to collate such data to provide a larger picture of musical behaviour and development for a wide cross-section of the child population. It is hoped that this information will continue to have a positive impact on how teachers understand and nurture the inherent musicality of their pupils and foster their ability to experience, enjoy, and benefit from music. The Sounds of Intent technology, as a quite novel music technology, will be at the teachers' disposal.

### **Notes**

- 1 There are parallels with the difference between 'methodology' and 'methods'.
- 2 <[www.soundsofintent.org](http://www.soundsofintent.org)>.



- 3 <<http://www.w3.org/WAI/>>.
- 4 See <<http://soundsofintent.org/sounds-of-intent?level=P3>>.
- 5 <<http://soundsofintent.org/videos>>.
- 6 Using P (performance)-scales is statutory when reporting attainment for children with special educational needs (SEN) who are working below level 1 of the national curriculum in the UK (see Standards and Testing Agency 2013).
- 7 The current list of sponsors and funders is available on the Sounds of Intent website.
- 8 Ofsted report directly to Parliament and are independent and impartial. They inspect and regulate services which care for children and young people and those providing education and skills for learners of all ages (see <<http://www.ofsted.gov.uk/about-us>>).
- 9 <<http://tinyurl.com/soi-books>>.

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