# INCREASING ACCESS TO MUSIC IN SEN SETTINGS

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## ABSTRACT

This paper presents some of the outcomes of a one year Higher Education Innovation Fund[1] funded project examining the use of music technology to increase access to music for children within special educational need (SEN) settings. Despite the widely acknowledged benefits of interacting with music for children with SEN there are a number of well documented barriers to access [1, 2, 3]. These barriers take a number of forms including financial, knowledge based or attitudinal. The aims of this project were to assess the current music technology provision in SEN schools within a particular part of the Dorset region, UK, determine the barriers they were facing and develop strategies to help the schools overcome these barriers. An overriding concern for this project was to leave the schools with lasting benefit and meaningful change. As such an Action Research [4] methodology was followed, which has at its heart an understanding of the participants as co-researchers helping ensure any solutions presented met the needs of the stakeholders. The presumption by the researchers was that the schools needed new technology to help overcome barriers. However, although technological solutions to problems were presented to the school, it was found that the main issues were around the flexibility of equipment to be used in different locations, staff time and staff attitudes to technology. These issues were addressed through the Action Research methodology to ensure that the technology designed worked for these particular use case scenarios.

## 1. INTRODUCTION

There have been several major reviews of music technology's use within SEN settings; within a general SEN educational context [1, 2, 3, 5], as well as particularly from a music therapy perspective [6, 7, 8, 9]. This growing body of literature supports the view that there is a growing interest in the use and the study of the use of music technology (MT) within these environments and by communities of practitioners. Music is used within SEN settings to support a range of activities, for example, formal class room based music teaching, one-on-one music therapy sessions, group music sessions [1, 3, 8] as well as being embedded in 'everyday' class room activities such as, signposting when it is time to get ready for lunch, or when to put your shoes on [3].

[1] HIEF funding is allocated by Research England with a remit to to support and develop a broad range of knowledge-based interactions between universities and the wider world, which result in benefits to the economy and society.



### 1.1 Benefits of music

Music has been identified as having a number of benefits in terms of promoting health and wellbeing, as well as having the ability to develop wider skills relating to participation, socialisation, attention and fine motor skills [1] [3]. The employment of MT has a long history of being utilised (for example, see [10, 11]) to help provide access to music making, particularly for those working within SEN settings where bespoke technologies can be used to overcome some of the physical or cognitive barriers that may be present for these children in using 'standard' acoustic instruments [6]. Recently there has been an increase in the amount of bespoke music technologies, specifically designed for the SEN sector, (for example [12, 13, 14, 15]) as well as a proliferation of music delivered through tablet based devices such as Apple's iPad [16, 17, 18]. (See Ward et. al. [5] for a full review).

### 1.2 Issues of access

In 2011, the UK Charity, Youth Music commissioned a review of engagement with MT in special educational and disabled music settings throughout the UK. This report [1] clearly sets out the benefits of using music technology for SEN children and young people, but also identified many barriers to the use of MT within these settings. In this review, these barriers are summarised under three headings: A need for specialist training; Resources; and A fear and dislike or indifference to technology [1 p. 31]. I will borrow these categorisations to revisit these issues.

#### *1.2.1 Need for Specialist training*

As already mentioned, there are a wide range of technologies available to enable the delivery of music within a classroom, ranging from bespoke hardware controllers to software running on tablet devices. These devices require a level of specialist knowledge to be useable and to interface with existing equipment. Like all technology, these devices are prone to constant change and upgrade cycles, and as such, there is a continual need for specialist training. In addition to the Youth Music report [1] this need for training has also been identified by a range of other authors: Welch et. al. [2] recognised a lack of knowledge and understanding of music technology among music therapists and teachers within a SEN setting. Of the 80% of sampled schools that used distance sensing technology in music, only 11% used them on a weekly basis. A UK based

survey of practice and attitudes to electronic technologies in clinical music therapy carried out by Magee [6] found that 65% of music therapists felt they had a lack of skills in using this type of equipment. This translated into the electronic technology equipment being 'in a box in a cupboard' [6 p.144]. A more recent study in 2012, by Hahna, Hadley, Miller and Bonaventura [19], surveyed 600 music therapists from the US, Australia, Canada and the UK. This found that 61% of respondents were self-taught, suggesting that more training was needed to make 'more technology accessible to a variety of learners' [19 p.456].

*1.2.2 Lack of Resources*

Lack of resources can be material in nature, for example, lack of physical technology; lack of funds to purchase technology; or it could be more intangible in nature. For example, lack of information about how to integrate the technology into the sessions; or simply lack of time to utilise the technology or learn about the technology. Findings from an international survey of music therapy practitioners by Hadley et. al. [20] reports on the barriers to entry as 'lack of money, lack of professional experience, lack of portability, lack of time to learn, limits of the facility, lack of interest, a belief that music technology is not appropriate to music therapy clinical work, or that music technology was not appropriate for their particular clientele' [20]. Farrimond et. al [1] identify barriers to MT provision around the area of cost of technology. They draw on Nagler [21] who found that the 'high cost of new equipment' was a barrier and Magee [6], who states that 40% of respondents to her survey of Music Therapists identify MT as being 'too expensive to buy' [6]. In more recent publications (2017) cost seems to be less of an issue, with a recent focus on tablet based interfaces [9, 3] suggesting that the relative affordability of tablet based applications for MT is increasing provision. Welch et. al. [3] suggest that 79% of schools have access to music through apps on tablets, with 65% having access to music software such as Garage band [16, 3, p. 9]. Despite the proliferation of tablet devices in schools and the availability of low cost or free apps, it is worth noting that tablet based activities are not suitable for all children, access to technology will vary with need, and bespoke technologies for MT can still be prohibitively expensive. (For example a new Soundbeam 6 [14] is around £2,500). The proliferation of available MT itself can become a barrier as Knight and Krout [9] note, the challenge that the sheer number of resources itself provides a challenge for the music therapist, in terms of knowing and evaluating which approach is best for their client [9].

*1.2.3 Fear, dislike or indifference of technology*

A fear, dislike or indifference of technology is Farrimond et. al.'s [1] 3rd category. This is supported by statistics from Magee [6], showing that 18% of therapists stated that they did not like technology and 4% thought that music technology was not appropriate/relevant for the clients they were working with [6 p. 143]. The most recent PROMSIE report [3] does note some marked improvements in the sector in the use and uptake of music compared with the similar survey of 2011 [2]: 'with more musically qualified staffing, a broader range of resources for the music curriculum, more external organisations available to support music, increased use of music technology and improved music therapy provision' [3, p.3]. However, the report does not specifically identify the attitude of staff towards the technology but it seems hopeful that with increased availability of technology within schools that Farrimond et al's [1] prediction has come true that the 'apparent acceptance of conventional technology might positively influence any negative perceptions of music technology over time' [1, p.33] . Despite all the positive outcomes form the PROMISE report there is no data on the actual use of MT within schools, in fact the report states '[o]ne caveat to these details is the extent to which, notwithstanding availability, schools regularly use such devices. Some comments suggested that this was not always the case [3, p. 9]. This is a sentiment echoed by others, for example Hadley et. al. state '[d]espite the passage of time, these barriers are still the same as quoted in Magee (2006)' [20]. Despite the seven years passing since Farrimond et. al.'s [1] review and the increase in the availability of MT based solutions, there remains many barriers to entry to using these technologies in the classroom and within music therapy contexts. Issues seem to still be present regrading, ease of use, cost (for specific specialist equipment), and especially around training of how to operate and how to integrate technology into the class room environment.

## 2. ACTION RESEARCH METHODOLOGY

Action Research is presented in Reason and Bradbury's SAGE handbook of Action Research [4] as following the following working definition: 'Action research is a participatory process concerned with developing practical knowing in the pursuit of worthwhile human purposes. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solution to issues of pressing concern to people, and more general the flourishing of individual persons and their communities' [4, p. 4]. In contrast to conducting research on subjects as objects, Action Research is very much conducted with stakeholders as "co-researchers" [4, p. 9] and has a primary purpose to "produce practical knowledge that is useful to people in the everyday conduct of their lives" [4, p. 4].

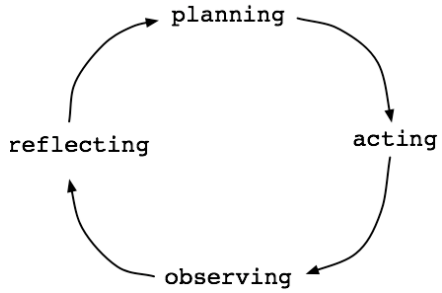


**Figure 1.** Action-reflection cycle [24, p.57]

An Action Research based methodology is iterative in nature with most projects following a cyclical process of action and reflection based on Lewin's [22] theory of action as a spiral of steps involving planning, fact-finding

and execution. Action Research's more recent models, such as that outlined by McNiff [23], describe a cycle of Planning, acting, observing, reflecting, planning.. etc. [23, p. 57].

Action Research was considered a suitable methodological approach for this project as its tenet of affecting change within a community aligns well with the ethos of this project to empower and leave a lasting beneficial change in communities. The spirit of working with participants as co-researchers also ties into ethical concerns relating to 'expert researchers' telling practitioners what to do. This is a particular concern when working with communities of marginalised voices such as the disabled. Since another aim of this project was to empower existing stakeholders and create a community of practice, it was very important that the stakeholders felt part of the research process and that their opinions were valued at least as highly as the researchers themselves. The Action Research cyclical process of observing, reflecting, planning etc. mirrors those found in participant design and as such helps ensure that any results from the project meet the needs of all the stakeholders involved.

# 3. CASE STUDY – SCHOOL A

Access to local schools was facilitated through Coda. Coda is a local charity who states their objectives on their website as: 'Coda uses music as a tool for personal and social change. We love music and believe in its power to transform lives. Coda provides a place to learn, train and develop, and we offer help and support through participation and therapy' [24]. Coda were already facilitating some training based around the use of music technology within local schools. As an entry point to the project we were invited to give a short presentation about the project and its goals to representatives from a number of local SEN schools that had attended one of these training sessions. After this meeting an open call to partake in the project was sent out to all attendees at this session and two schools responded. The scope of this article is around the outcomes of working with one of these schools.

## 3.1 Data Gathering

Data was primarily gathered through minutes of stakeholder meetings, open or semi-structured interviews and reflective writing by the researchers. Stake holder meetings were initially with AA, Pupil Technology and AAC lead - & BB, Head of lower school (ex music teacher), Tom Davis (TD), Lead Researcher and Daniel Pierson (DP) Research Assistant. Later meetings were generally with AA, TD & DP and a range of pupils from the school. There was also a project steering group consisting of TD, DP, Ann Bevan (AB) and Phil Hallet (PH) from Coda.

## 3.2 The School

School A provides education for pupils who have severe, profound and multiple learning difficulties. The large majority of pupils have one or more additional needs, including autistic spectrum disorders, medical needs, sensory impairments and emotional, social and mental health difficulties. Ofsted school inspection report 2015. School A describe themselves in their literature as 'a specialist school for children and young people who have Complex Learning Difficulties or Disabilities' They have a wide range of pupils with a range of needs, but quite a large proportion with Profound Multiple Learning Difficulties, with an associated wide range of varied and complex needs.

## 3.3 Current Music Provision

It was evident from the first meeting with the stakeholders that there was a passion for music and a great desire to include more of it within the school. BB stated that up to recently (Academic Year 2015-16), they had had a dedicated music therapist, but due to funding constraints this was stopped. Also, "years ago" (no timescale given) they used to have a dedicated music teacher that retired and not replaced. Instead a decision was made that music would be delivered by the class teachers. Music is used in a lot of ways in the ordinary classes, from helping with routine through to teachers delivering music lessons. There was some feeling that the music provision by 'normal' class teachers was difficult as they may not be trained specialists in music. Music is also used to make everyday teaching more accessible. For example, if reading a story there are audio cues to engage the pupils and music is used in a lot of ways to facilitate their learning. Music is also used throughout the day to help structure activities, such as a song for putting on their shoes, getting ready for lunch etc. School A has some outside support in delivering music. Coda, a music charity comes into the school and runs weekly sessions with the pupils. This normally culminates in a performance or a project.

## 3.4 Main barriers to access

### *3.4.1 Staff Perspective*

Issues at School A still echo those outlined by Farrimond et al [1]: staff not musically trained; issues around asking non-musically trained staff to come up with a deliver music based activities and a fear and dislike of technology. For example, comments suggesting that the staff were scared of technology. Staff comments about the Soundbeam 2, a commonly used piece of equipment in the school; 'it's technology', ' it's big', 'there's a lot wires'; "Oh man, it's got more than 3 buttons" AA. An additional issue raised was the issue of tight time constraints for both teachers and support workers. 'It can't take something like 30 minutes to setup it needs to be plug and play … People struggle with time … So I think the impact is that it really has to be something that can used by everybody in the school and that every member of staff should be able to use without too much help' AA – Interview July 2017.

### *3.4.2 Student Perspective*

The students at School A have a range of leaning difficulties often with combinations of issues. As identified at the first meeting the main barriers to access from student perspective were: difficulty physically accessing things; issues of motor control and lack of grip strength. Another issue identified was visual impairment (VI), not as a standalone condition but paired with other learning

difficulties and disabilities. Two pieces of equipment that were particularly identified as being preferred by the pupils were the resonance board (a sheet of wood slightly raised off the ground designed to resonate and amplify acoustic sound), and the OmiVista [25] (an interactive floor projection system).

*3.4.3 Outcomes of first stakeholder meeting*

As the majority of researchers on the project had a music technology background there was a tendency for the team to propose technical solutions to the perceived problems. An idea to come from the first meeting was that the researchers' thought that the school would benefit from the design and construction of an active vibro-tactile resonance board that could be linked to the OmiVista to make it more interactive. This idea was proposed to the stakeholders at the 2nd meeting. Issues that arose from this meeting were that the board needed to be easily accessible and easy to use. The school has a current vibro-tactile resonant board, but it is located in a sensory room and any sound has to go through a specific Hi-Fi. This presented a number of problems around accessibility. There is only one sensory room in the school and students are allocated time in there in relation to need. This means that not all pupils get access to this space. The board in there is also quite high off the ground which means that students have to be hoisted into position on the board. This takes time and some students are dependent on their wheelchairs and can't be hoisted. The board can only be used to play sounds through and isn't an interactive environment for the pupils to take part in. 'The challenges for the boards are that they need to be portable – i.e. so you can take them into as many lessons as possible. They need to be easy to use. They need to just plug them in and they work. They need to give good vibro-tactile feedback to the students – the students need to want to use them ..' (TD Reflective writing.)

### 3.5 Resonance Board Development

**Figure 2.** Reckhorn BS-200 Body Shaker [26] mounted on small resonance board

Following the requirements outlined in the stakeholder meetings and subsequent interviews the team created a vibro-tactile resonance board that could be taken anywhere in the school.

This vibro-tactile resonance board consisted of a Reckhorn BS-200 Body Shaker [26], a low frequency transducer such as those used in gaming chairs, connected to a plywood board. The transducer was driven by a 100W amplifier and was positioned to try and create an even distribution of frequencies across the board. The transducer outputs as low as 5Hz but also produces vibrations in the audio range, meaning that you get a tactile as well as an audible output.

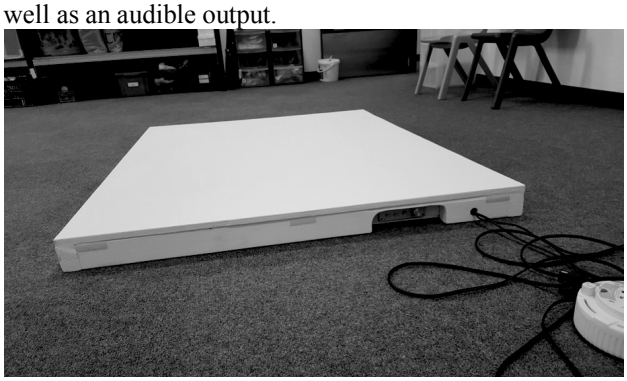

**Figure 3**. The larger resonance board.

Initially a small board was made (610mm by 1220 mm by 18mm). The board was raised off the floor with some pine runners and the transducer mounted underneath. Importantly this board was low enough and strong enough to support an electric wheelchair. This meant that if needed, students could access the board without needing to be removed from the wheelchairs. The tactile vibrations are strong enough to be felt through the chair, albeit in a reduced manner. The board went through a number of evaluation sessions with AA and a number of different pupils. A larger board was also created, (1220mm by 2240mm by 18mm) which was designed for larger/older pupils to lie down on. The larger board was also painted white to enable easy projection of the OmiVista [25] onto its surface. Also the amplifier on both models was swapped for a less powerful model [27] that was smaller and could be attached to the underside of the board. This meant that the board could be used just by plugging in anything that has a 3.5mm audio jack output and operated with one power switch.

**Figure 4.** Pupil using the resonance board with a Skoog [12].

### 3.6 Evaluation of the Resonance Board

Since most of the students that used the system could not verbalise, we relied very much on their careers' assessment of their level of engagement. However, as you can see from the examples below generally there was very positive feedback. So much so that students were foregoing their normal preferred instrument of choice, i.e. the guitar

in favour of the new system. The following two transcripts are just some of the examples that demonstrate evidence that the students had valuable interactions with the resonance board.

*3.6.1 Example 1*

Transcript with Pupil 1, AA and a Teaching Assistant (TA) – DP also in attendance. (5th May 2017).

TA: Oh Hello , what is going on?
AA: He is absolutely loving it.
TA: You've got the piano?
AA: Yes but it is much more than the normal piano because he has got the sensation as well.
TA: Clever people. That's amazing.
AA: He was lying really, really still and then moving.
TA: Amazing!
AA: It's awesome isn't it.
TA: It really is.

*3.6.2 Example 2*

Pupil 2 using large resonance board wired up to the OmiVista. AA & DP in attendance 5th May 2017. AA then took a guitar from the shelf and put it near the pupil. He strummed the guitar only briefly before rolling away from the guitar onto the other side of the board. AA was surprised by this, saying "Wow, that's quite telling if the guitar doesn't get any attention!" This was a key moment as AA recalled it even after the session was over, saying "I'm amazed, because he always would go for the guitar". She explained that "If somebody walks into the room with a guitar he's like this-" motioning outstretched arms towards the guitar. AA: "I'm amazed because he will always go for the guitar and he just didn't. No, not interested in that thank you" (5th May video 2017).

### 3.7 Legacy of the project

*3.7.1 Lasting change.*

The funding period finished in July 2017 and the equipment was left with the school without any further follow up or support. Researchers returned to the school in January 2018, 7 months after the end of the project to see if there had been any lasting changes in the school . On arriving at the school, AA took TD up to the classroom to show the resonance board in use. In the interview that followed it transpired that the boards are being put to ongoing and continuous use. They have been used with a variety of existing equipment within the school including, the Beamz [13] , the Skoog [12], microphones, and iPad apps. The school have gone as far as actually purchasing an additional Skoog [12] so that they have an extra one to use with the new board. The only continued barrier to access was with using it with the OmiVista [25]. The OmiVista itself still needed modification to work with board. (A side panel needed unscrewing to access the audio output). This was a barrier for the staff, and a health and safety concern for AA so the board was not being used in this way.

*3.7.2 Use in the classroom*

On asking if the board had increased access to music for these students AH replied: "The context hasn't always been in the context of making music – but certainly they have been experiencing sound in a different way" (AA 19th Jan. 2018). In general the board has increased access to experiencing sound for the children. The existing resonance board is too tricky to use. It is high up such that wheel chairs can't be put on it. The sound system in there is too complicated and there isn't as much vibration from the box itself. In contrast this solution 'everybody can use it. If you can plug in a pair of headphones you can use it.' AH 19th Jan 2018) Having a moveable board means that more children get access as it can be used not only in specific music lessons (these happen in the room with the large resonance board in which is not so portable) but rather in the standard classrooms. This means it can be used not just for the delivery of music but anytime that they use music/sound throughout the day, which adds enrichment to all sorts of activities.

*3.7.3 Results of training*

AA had recently run a training session with the board as part of an inset day to a large group of staff. Mostly, at the moment, staff are trying ideas suggested by AA, but there's a lot of interest and people are excited about using it. As AA states: 'I think the other thing is that after the training, people are more excited about it. Which means that if people are excited about something they want to do it. So it means that music happens. Where as before it might not have happened much. I think that that is a big difference actually. That people want to do it.' AA.

*3.7.4 Impact of small interventions*

I would like to share one event that demonstrates the amount of impact such a small change in providing access can have on a child and their careers experience in school. One child, with hearing impairment normally does not react in any way to sound. He cannot leave his wheel chair so cannot use the current resonance board setup in the sensory room.

"one of the teachers came up to me and said, we had an all tears moment. because one student doesn't normally react at all to music. And it was a really, really big reaction. but they were like, we were all crying. (Laughing) That's really, really, lovely. (AA, interview 19th Jan 2018) I've just seen photographs of the board session that made all the staff go all teary and I have to say, it nearly got me too!!! To see the reaction of someone with massive sensory impairment feeling the rhythm coming up through his wheelchair really is awesome. Unfortunately I cannot release any pictures of this specific student, but I can tell you that it put a massive lump in my throat. (AA email correspondence 25th Jan 2018)

## 4. FINAL THOUGHTS

This project shows that despite improvements documented in the literature, many SEN schools still have issues accessing music through technology. The main barriers are not to do with the technology itself but, rather, with their context of use. Difficulties arise with either a lack of knowledge of how to use the technology, either from a technological perspective (how do I turn it on?) or from a

musical perspective (how do I use this technology to deliver music?). This project again highlights the real need to create outputs that work with and for stakeholders. The Action Research methodology helped assure that any design decisions benefited the stakeholders and ultimately made the finished technologies useable within the school context. Although the assumption going into this project was that the solution would be in the development of new technologies, the technologies developed in this project are not new, in fact they are really modifications of technologies that were already found in the school. What is different, is the ease of which they can be used in a variety of different environments. The flexibility to just move them to different classrooms, to plug them into a range of input devices (depending on pupils needs) and the ability to use them with pupils whilst in wheelchairs meant that pupils who normally didn't have access, suddenly had access to music. This ease of use, and associated staff training, meant that staff were willing to try the technology, so ultimately it was integrated into everyday school activities. Most gratifyingly, you can see from the final correspondence from the school, what impact these small changes can have on an individual's life experience.

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