The Painting of Sound

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Introduction

As an academic discipline, Music is essentially cross-curricular. It is hard to imagine a performance, composition or other musical activity that has not been influenced or mediated, in part, by another discipline. The context within which music-making itself inscribes itself upon sound itself including the ways in which it is produced, organised and communicated.

It has long been my contention that music teaching itself needs to acknowledge this simple fact more readily (Savage 2011). In recent years I have argued that a cross-curricular approach to teaching and learning in music should be empowered through a synthesis of knowledge, skills and understandings from various subject areas. This synthesis should exhibit itself in an enriched pedagogy that will promote an approach to musical learning that embraces and explores music itself and other subject areas in a more holistic way. In this chapter I will explore how technology can facilitate this process in a meaningful way. In particular, I will consider how key thinking and technology from the visual arts can develop music education, and particular the teaching of musical composition, in new and helpful directions.

The 'Subjectivity' of Subjects

Goodson and Mangen define subject cultures as being 'identifiable structures which are visibly expressed through classroom organisation and pedagogical styles' (Goodson &

Mangen 1998, p.120). These ‘identifiable structures’ exist in many forms. They include the ways in which knowledge is organised within a subject, the pedagogical approaches that inform its delivery in a teaching setting, the codes of behaviour or professional conduct within the associated subject community, and much more besides. The University of Bristol investigated how technology can mediate across subject cultures. As a first step, they investigated four major dimensions across which subject cultures might differ significantly in respect of their relationship with technology. These were:

1. Sunk costs. Theses refer to the material and symbolic investments teachers have consciously or unconsciously made in conceptions of the content of the subject, its purpose, how it should be taught;
2. Modes of learning. This refers to the characteristic processes, demonstrations and outcomes of learning within the subject culture. Equally taken for granted are what counts as success in the subject, how it is achieved and how it is known;
3. The relationship to wider contexts. Subject cultures are differently situated in terms of their wider contexts and how they relate to them. The most important of these contexts are the National Curriculum and the subject's place in the pecking order of the school, both of which may impact critically on their access to and use of technology.
4. The relationship between technology, pedagogy and content. This is the most directly relevant dimension and constitutes in some respects the sum of the others. It has been usefully seen as made up of four principles; 'teachers first; complementarity (with existing practices); workability (efficiency); and equity. (University of Bristol 2010a)

In the second stage of the research, through the construction of ‘Subject Design Teams’,

teachers and researchers collaborated together to share and discuss related research, classroom experiences, software and equipment. Sub-groups of these teams then worked together to develop learning initiatives which:

- Centred on key areas within a subject domain;
- Incorporated a range of technologies as appropriate;
- Incorporated ways of taking into account students' existing knowledge;
- Focused on the development of a community of inquiry;
- Focused on learner-centred and knowledge-centred environments;
- Focused on problem-solving and creativity. (University of Bristol 2010b)

The findings of this study are presented online through groupings of materials produced by each Subject Design Team (University of Bristol 2010b). But a particular area of relevance for our discussion here is the influence of the teacher in incorporating technology within their pedagogy. Using technology to build bridges between subjects, even within the arts, is not simple because there are a range of powerful, historical forces that mitigate against this. As John comments:

> At the core of this 'cultures in tension', is the idea that the particular discourses that have dominated the educational landscape for more than a century and a half have been thrown into sharp relief by the rise of digital technologies. (John 2005, p.471).

This tension can result in individual subject areas retracting and consolidating, and technology skills being situated as part of a wider generic and functional agenda for education. In reflecting on his research within the InterActive Education Project, John's conclusions explore the use of a metaphor (trading zones) through which subject cultures can begin to build bridges in a cross-curricular way through the use of technology. In the

following extended quote from his paper, the metaphor is introduced and then applied:

> Of central importance, however, were the ways in which the crucial 'borderlands' between the subject and ICT became transaction spaces or what Galison (1997) terms 'trading zones' where exchanges and intense collaborations took place. In Galison's (1997) book, *Image and Logic: The micro-cultures of physics*, we are able to watch the fascinating trading that takes place between the various sub-cultures of physics (theoreticians, experimentalists and engineers) and how the various traditions underpinning the sub-cultures remained intact inside the collaborations that went on among them. These collaborations produced two competing instrument cultures—image and logic—which ultimately joined. Taking his lead from anthropology, Galison (1997) observed how exchanges between sub-cultures can be compared to the incomplete and partial relations which are established when different tribes come together for trading purposes. Each tribe can bring things to the 'trading space' and take things away; even sacred objects can be offered up and exchanged. This trading process also gives rise to new contact languages which are locally understood and co-ordinated.
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> The metaphor of 'trading zone' highlights the transient, evolving and incomplete nature of the relationship between subject sub-cultures and ICT. ... To occupy a 'trading zone' does not mean abandoning one's 'sacred' disciplinary 'home' nor allowing the 'profane' to dominate the exchange; rather it respects subtle negotiation and accommodation (Wertsch 2003; Claxton et al., 2003) processes that encourage multiple and modified identities to emerge over time. (John 2005, pp.485-6).

Mediated cross-curricular exchanges or interactions, at their peak, they may lead to an opportunity for new language or discourse of cross-curricular teaching and learning to emerge, locally situated and, perhaps, of value and understood only to those directly involved (but no less educationally valuable because of this). But this will only happen when the items that are being exchanged are of value. Within every academic discpline,

there are plenty of examples of low value exchanges that merge subjects down to their lowest common denominators, underplaying their well-established strengths and replacing them with hastily constructed curriculum components or competencies. These tend to disempower teachers and cut short the development of their own, unique cross-curricular pedagogy through imposed, disrespectful and crass curriculum exchanges. In contrast, high value cross-curricular exchanges, John argues, will result in meaningful curriculum development because they are centred on attributes that underpin ongoing teacher development.

To summarise the argument so far, traditional subject cultures are a powerful force. They are an important element of the teaching and learning context that all teachers face. Technology presents an opportunity for mediation between these subject cultures. This can be done effectively or ineffectively, in a powerful way with 'items' of high value or superficially with those of a lower value. The notion of cross-curricular exchanges between subjects, mediated through technology, if desirable (and I think that this is), need to be based on mutual respect between subjects, acknowledging the provisional nature of their transactions and, preferably, contain items of value.

Developing Mediated Action as a Springboard to Higher Value Exchanges

Pole-vaulting has a long history (Rosenbaum 2009). The first known pole vault competitions were held during the Irish Tailteann Games, which date back as far as 1829 B.C. The sport was an original modern Olympic event in 1896. Central to the sport of pole vaulting is the pole! This is a simple technology. But in the history of pole vaulting, this tool and the materials from which it has been made have been the source of many problems for the sport.

Early poles were made of wood. They were probably just large sticks or tree limbs. In the 19th century competitors used wooden poles, but these were replaced by bamboo (lighter) prior to the Second World War. Subsequent developments saw the emergence of metal poles (stronger). Today, the modern athlete has the benefit of carbon- fibre and fibreglass composite poles (which are lighter, stronger and more flexible). Despite the changes in the materials used to make the pole, the aim of pole-vaulting has remained the same: to get over the highest possible barrier. In 1896, the first time that pole-vaulting was included in the Olympic Games, William Hoyt won with a leap of 3.30m; the current world record of 6.14m by Sergey Bubka in 1994.

Wertsch's more detailed account of these developments (Wertsch 1998, pp.27-28) charts the various rivalries and factions within pole-vaulting that emerged at transition points surrounding the adoption of new poles. At one point these even included the possibility of breakaway groups favouring a particular type of pole, and accusations that users of new types of poles were cheating. The history of pole vaulting itself distinguishes between the various 'eras' of particular poles (On Track and Field 2009).

As a tool, Wertsch argues, the pole is essential to pole-vaulting. It mediates the action between the athlete (the agent) and the goal of hurtling over the barrier at the highest possible height (the context). Drawing on theories from sociocultural analysis, he explores the relationship between human actions and the cultural, institutional and historical contexts in which this action occurs. In our context, teachers or pupils are the 'agents' (to use Wertsch's terminology), the 'cultural tools' are the technologies we are choosing to use, and the context would be, at least in a simple application of his work, the classroom or other learning spaces where pupils work. Wertsch calls the interplay between agents, tools and contexts 'mediated action'.

All music teaching and learning involves mediated action. Our teaching is mediated by the tools that we choose to use; our pupils' formal and informal learning is mediated by the tools they choose to use too. These tools will include numerous musical and other forms of technology, the language that we use to describe and use these technologies, the curriculum framework we are working within, the pedagogical approach that we choose to adopt and many other things too. The educational goals that we, or pupils, establish and work towards exist within this wider conceptual framework of mediated action. So, just as you can jump higher within pole-vaulting with certain types of poles, you can aim for different educational goals through the effective use of some technologies or tools. Similarly, it may be possible to aim for more challenging, complex music teaching and learning if the technologies or tools that you have chosen to use take care of basic, lower level functions or issues. The point here is that these tools exist within a wider relationship of teaching, learning and cognitive processes. The teacher's key role will be seeking to exploit the possible educational affordances offered through these relationships.

My argument is that by analysing the technologies that we are using in our subject area through the concept of mediated action that we will be able to build a firm foundation from which we can extend our teaching approach towards a cross-curricular model. This will include working from within our subject and drawing on other curriculum areas, as well as making explicit collaborative links with other subjects through technology. We will turn our attention to this later point first.

Starting with the Technology

First of all, and perhaps most obviously, there will be a range of common tools that are in use across multiple subject areas within the school. Technologies such as digital video

cameras, digital cameras, presentational software and word processors are good examples of these. As these technologies are in wide use, they present a good opportunity to explore a broader, cross-curricular approach to their use.

As an example, we will consider one of these tools, the digital camera. As a generic tool, this piece of technology has many potential affordances across a range of subjects. It is also a technology that many pupils will be familiar with through incorporation of its functionality within mobile-phones. What are the consequences of this within our music teaching?

Within the curriculum planning that you are doing, it will be important to ask what role you perceive the digital camera will play. It may be used as a device to collect digital materials (e.g. photographs of a geographical feature; documentary evidence from an historical artefact; or sample material for an artistic project). But the digital camera might be used for assessment purposes (e.g. to provide evidence of pupils' group work in a drama or dance activity). Or it might have a more formative assessment use, as part of pupils' peer or self-assessment within a collection of reflective data within an e-portfolio of evidence for physical education. The digital camera may also be the focus of project itself within the design and technology, or art, curriculum. Here, pupils may be learning techniques about how to use a digital camera more effectively, studying technical issues such as the use of different exposure settings, or artistic issues such as how to frame a photograph or the use of different perspectives.

It would also be beneficial to explore with pupils what roles they envisage the digital camera might play. The different perceptions that people have about a particular tool will shape their potential use of it. In theoretical terms, mediated action shows us that the

affordances of a tool (i.e. the beneficial processes that it facilitates) are as much about the agent's perception as they are about the actual tool itself. In our example, if we want to get the most out of the digital camera as a tool within our teaching, it will be important to acknowledge that it not only spans across many subjects (and different teachers will have different perceptions of its usefulness and application), but the perceptions of pupils too, as agents within the learning process facilitated by mediated action, will shape the educational possibilities that it affords.

This broad range of activity across the curriculum, but all supported by this one piece of technology, presents a good opportunity for developing a cross-curricular approach within the teaching of music. Whilst you might not be an expert on using a digital camera yourself, it will be important that you are aware of the range of work that is going on, and prepare yourself to make the links to other curriculum or educational uses of the technology explicit in your work with the pupils. For example, if you are asking pupils to use the camera as a means to collect evidence for a piece of assessment that you are undertaking, try to adopt a similar routine to the collection and storage of the digital photographs. Perhaps pupils have been taught a system for naming the resulting digital files within their ICT lessons. Make sure that you are aware of what this is and use the same system within your lessons. In art lessons, pupils may have considered aesthetic issues related to framing a photograph, the impact of light or colour on a particular shot or how objects are placed together for an expressive affect. Therefore, try and ensure that pupils are using the technology in ways that reinforce their learning with the same tool in other subject areas. This cross-curricular approach should seek to make it easier for pupils to transfer experience and expertise from one subject area into another, rather than creating boundaries that limit this type of knowledge exchange. In this way you will be reinforcing lessons that pupils have received from other teachers in a helpful manner.

Pupils may have experience of using this piece of technology in their wider lives. Perhaps not many of them will be expert photographers, but most of them will use their mobile-phones as digital cameras and will be enthusiastic about their use of these to document their attendance at sporting or entertainment events, or to take pictures of their friends and social activities for use on social networking sites. This presents us with an opportunity to link to broader uses of this type of technology. Instead of asking pupils to write down their homework task, why not consider letting them take a picture of the whiteboard instead? Rather than asking pupils to search through Google Images illustrations for a piece of project work, why not ask them to devise and shoot their own image using their mobile-phones and bring that into school or upload it to an appropriate folder on the school network?

The example of the digital camera can be extended to other pieces of common technologies used in all subjects. Although some subjects may claim a greater 'hold' over a piece of technology, exploiting the various uses of a common tool across a range of subjects within your own subject teaching can be a straightforward way to bring an extra, cross-curricular element to your music teaching.

Starting with the Subject

Starting with pieces of technology can help us form useful and productive links between subjects and the learning contained therein. However, there is a more fundamental way in which the process of mediated action can apply to our work as teachers. This relates to the key ideas and cultural practices contained within specific subjects and how these are evidenced in wider life. For music educators, one of the key links is within the visual arts.

Music and the Visual Image

The relationship between music and the visual image are long established in artistic practice generally, extending back through the centuries:

> Composers and painters alike have frequently gleaned new ideas from an approximation to, or borrowings from, procedures used in the sibling art. This reciprocal relationship runs like a continuous thread through the entire [twentieth] century. (Maur 1999, p.8)

Perhaps one of the most famous and obvious examples of a painter considering musical themes is Paul Klee, for whom music 'was the one discipline of art above all others that inspired profound insight' and showed him 'the innermost essence of nature, not a reproduction of it' (Düchting 2002, p.88). But throughout the entire twentieth century the symbiotic artistic processes and conversations between the visual artist and composer are apparent for all to see (and hear).

> There are no dividing walls between the arts. Music combines within itself poetry and painting and has its own architecture. (Ciurlionis 1998, p.53)

> Colour is the key, the eye is the hammer, the soul is the piano with its many strings. (Kandinsky 1947, p.64)

The contemporary practice of sound design, where composers produce music and sound effects for film, television, computer games, theatre and much more besides, could be thought of as being 'the painting of sound'. It is not surprising that sound designers talk about their work with sounds by way of visual metaphors. For example, Andrew Diey talks about the brush strokes of his compositional style:

> I feel that sound design is an area in which you can either paint with very large strokes or very fine strokes. You can go as deep as you like and put as much detail in as required. Or you can just paint with broad strokes. (Andrew Diey in interview, 2004)

or the relationship between the choice of sounds and particular colours:

> The overall feel and colour of the movie is washed out colours, lots of blues and dark sort of deep browns and things like that. So it automatically suggests a sort of cold feel to the actual sound itself. There's not much warmth in the colour so I have to reflect that in my choice of sound. (ibid)

The choice of which software I use with pupils at Key Stage 3 and 4 has been influenced by these ideas. In the past I have chosen software that has an explicitly graphical, artistic interface. Pieces of software like Metasynth proved useful in many projects (Savage & Challis 2002). But even with more conventional music software, there are ways of encouraging pupils to use metaphors from the visual arts as a way to get them composing productively.

Developing a Project-based Approach to Learning

Over recent years, I have noted other music teachers following a similar vein of thought. In a small class at a high school in south-west Manchester recently, I watched a music lesson where students were producing a sound design for a film (produced from an assembly of digital materials that they have collected from their local environment). The school is for pupils who have been excluded from mainstream schooling; all pupils have statements related to their emotional, behavioural, or other learning difficulties. At the point to which this extract from my notes refers, the pupils are working on their sound designs in a computer suite.

I observed the pupils compiling collections of digital photographs, short video sequences, musical elements and other materials sourced from the Internet into short film segments. They did this in different ways. Some searched through collections of materials that they had collected. Having found appropriate material for their film segment, students manipulated it in a variety of ways. For photographic material, this included using some of the basic tools in Photoshop, including cropping and panning techniques. For video materials, students used iMovie or MovieMaker to select the start and end points of particular video clips, add basic digital effects, and insert transitions between photos or video clips. The majority of students also produced narrative elements such as titles or occasional words and sentences in order to structure their film. Many of the students used the Internet to search for accompanying pieces of film footage, sound effects or music to use within their films. This produced some very interesting artistic juxtapositions which pupils found inspiring, allowing them to move their creative work forward quickly and purposefully.

As I was walked around the classroom I took the opportunity to talk to several pupils. Most were happily engaged in the above activities and were concentrating hard on their work. This was impressive. All pupils within the school have emotional, behavioural or other learning difficulties (hence their referral to the school). But there was no lack of attention in this class! Several pupils commented that they had used their mobile phones to grab images, sounds and videos during the weekend prior to this class. They talked enthusiastically about how they shared these digital materials with their friends informally through sites such as You Tube. The links between this informal learning with their mobile phones were being acknowledged and built up helpfully by the teacher.

At the end of the lesson pupils were asked to talk about the work they had completed. Given the small number of pupils in the class every pupil had an opportunity to discuss what they had done and show a clip from their film. The teacher used a video camera to record these short presentations. He said that trying to get pupils to write about their work was difficult. For purposes of assessment (these pupils were studying for a GCSE in Expressive Arts), regular video recordings of this type were included within individual pupil's e-portfolios. This way of working suited the pupils better and led to far less challenging behaviour.

In what was a successful piece of collaborative cross-curricular, musical composition within the Expressive Arts curriculum, the use of technology helped pupils bring together their ideas, work across a range of traditional curriculum areas and produce a number of successful short films with high quality sound design. The starting point was music; the end point was a productive mix of learning in many subject areas. There were two further thoughts that struck me as I reviewed my visit.

Developing a Reflective Pedagogy

The first of these related to the pedagogy of the teacher. It reminded me of another story, this time from the United States of America, of young people working with iMovie. Schoonmaker's account (Schoonmaker 2009) highlights the difficultly of adopting the 'right' pedagogical approach to the use of technology in the formal classroom. He picks up on phrases first developed by Prensky (Prensky 2001) – digital native and digital immigrant – to describe a difference in mindset between those bought up with digital technologies and those who 'adopt' them but retain their 'accent' of a previous age. These thoughts are picked up at the end of his study. Having recounted a situation where a teaching colleague (Brad) wanted to give the students printed instructions to follow to help them learn about

iMovie, he comments that:

> Digital Immigrant teachers assume that learners are the same as they have always been, and that the same methods that worked for the teachers when they were students will work for their students now. But that assumption is no longer valid. Today's learners are different. Is it that Digital Natives can't pay attention, or that they choose not to? Often from the Natives point of view their Digital Immigrant instructors make their education not worth paying attention to compared to everything else they experience – and then they blame them for not paying attention!
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> In the 15 years I had been working with digital natives, I realized that I had managed to sufficiently sand down my immigrant accent. These natives wouldn't need printed instructions to refer to after the training session. They would need the time to explore and experiment. When I told Brad this, he was at first surprised, but as he watched the kids relishing in new frontier of video editing ahead of them, it made sense: "If 4th, 5th and 6th graders can get it this easily, I have some rethinking to do with my high schoolers,
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> At the risk of over-romanticizing the ascent of digital natives, they are in fact learners in need of teachers with timeless lessons. The question is, will teachers put the effort in to engaging with young learners in ways that fit their newly acquired and very different learning styles? If so, teachers must focus on their learning as much as their teaching.

Within my observation, much greater attention had been paid to ensuring that pupils' work with these digital technologies inspired and motivated them. The pedagogy adopted by the teacher allowed them the time and space to choose and use particular technologies within the formal classroom in a way that built on their experiences with a range of other technologies (e.g. mobile phones, YouTube, etc.) through their informal learning. This enhanced the pupils' whole educational experience.

Maintaining a Subject Focus

Secondly, the teachers and pupils were working within an explicit, cross-curricular framework mediated by the GCSE in Expressive Arts specification. In that sense, there was a clear license for cross-curricular artistic practices that draw on at least two specific, individual art forms. By comparison, in projects that seem to be increasing in popularity in our schools, the subject dimensions of the curriculum are being collapsed in order to allow pupils to work on what are commonly called 'competency' curriculum. This type of ‘curriculum development’ is structured around competency statements and these inform the types of activities that pupils undertake and the way that they are assessed.

This is a retrograde step. My worry is that within pieces of curriculum development of this type, that the perspectives of individual subjects seem to be undervalued, not in an explicit or deliberate way, but rather through a general sense of other things being more important (perhaps by unintentional neglect). To return to the type of activities recounted above, the lack of a subject component within a cross-curricular framework like this could be educationally devastating. These might include:

- The artistic dimension of using these digital tools (which an art specialist could have provided) being underdeveloped;
- The skills required to construct a strong narrative throughout a film (which could have been provided by an English specialist) being weakened;
- The impact of sound and music within the film (something that the music teacher contributed) not being considered.

Curriculum initiatives that seek to collapse the long standing, subject divisions in the

curriculum (whether for one day or for one term) need to consider very carefully what they are replacing it with. This is not an argument in favour of rigid, subject approaches at all times and within all schools. Rather, there is a richer, cross-collaborative approach that should be possible to initiate, develop and maintain when teachers start with their own practice and make links from that, rather than having to respond to top-down, formulaic curriculum development.

One of the major benefits of recent developments in technology is that they provide a different way of engaging with traditional subjects. Numerous examples could be given but perhaps one of the most striking is the huge variety of 'apps' for tablets and other mobile devices. The inventiveness and creativity that these apps often contain is testament to a new way of thinking about structured engagement with a particular knowledge area and a collision with the concepts of gaming as a form of motivation for learning within it.

The plethora of music related apps in support of knowledge areas as diverse as Chopin's piano music, the development of jazz improvisation skills, learning one's key signatures or musical composition draw on visual elements, game-based strategies, written instructions and digital audio to help develop, engage and sustain the user's learning over time. Multimedia approaches to education are longstanding, but this a revolution in terms of accessible content and the tools through which it can be accessed. However, this does not make the teacher redundant. Their role is more critical than ever. Thinking about Wertsch's metaphor, the materials of the pole may have changed, and the rules of the game may changing as well, but the aim of the sport is still to clear the bar. The aims of a music education can be debated, but perhaps, rightly, they have not changed hugely over the years. The approaches that music education adopts to achieve these aims, underpinned by the choice of whatever tools seem appropriate, are a matter for continued debate. It is

my contention, however, that moving music education towards a richer cross-curricular way of thinking as outlined in this chapter presents a productive way forward.

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