MIR IN SCHOOL? LESSONS FROM ETHNOGRAPHIC OBSERVATION OF SECONDARY SCHOOL MUSIC CLASSES

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ABSTRACT

To help maximise the usefulness of MIR technologies in the wider community, we conducted an ethnographic study of music lessons in secondary schools in London, UK. The purpose is to understand better how musical concepts are negotiated with and without technology, so we can understand when and how MIR tools might be useful. We report on some of the themes uncovered, both about the range of technologies deployed in schools and about the ways different musical concepts are discussed. Importantly, this rich observation elicits some of the nuances between various high- and low-technologies. In particular, we discuss issues of multimodality and the role of technologies such as Youtube, as well as specific issues around musical concepts such as genre and rhythm.

1. INTRODUCTION

Over the past decade the field of Music Information Retrieval (MIR) has blossomed, leading to the creation of many useful analysis techniques and systems. We wish to increase the benefit of MIR techniques to society, and to help develop MIR in ways that connect with new use cases in real-world contexts. This requires that we work with user groups directly, adapting our approach and conceptual toolset to that of the user groups: in other words, it requires recognising that MIR has its associated culture with its own assumptions and interests, which may differ from the assumptions and interests of a particular user group, and working to bridge any divides. Connecting with user communities in this way is not just a way to disseminate research outputs, but can bring fresh ideas and perspectives into the research process.

The present study was conducted in this spirit, with a specific view to investigate how new digital music technologies might be developed or adapted for the school music context.

This paper discusses some of the issues brought out from research conducted in London secondary schools over the period November 2010 – March 2011. The full ethnographic analysis cannot be represented in six pages; in this paper we first describe the setup of the study before considering a range of findings relevant for the MIR community. We discuss the use of different musical concepts (Section 3) and different technologies (Section 4), before ending with a discussion reflecting on the lessons for the use of MIR technology in the school music-lesson context.

2. SETTING AND METHODS

We chose to use an ethnographic approach, so as to elicit a rich *thick description* of the way music-related ideas are used and relate to each other in a specific context. The sensitising questions used to guide the ethnography were:

> *What music-related concepts do teachers and students negotiate in music classes?*
> *How do they achieve this – with, and without, technology?*

We note that such "sensitising questions" do not serve as narrow research questions to be answered specifically, but as a thematic core for the observations and analysis.

The study was conducted in music lessons at two secondary schools in London. The two schools were selected after contacting a small selection of comprehensive secondary schools in the London area with music programmes.

- **School A** was located in East London, with around 1200 students. The school had $\approx 15\%$ having special educational needs, and $\approx 50\%$ obtaining five or more A*–C GCSEs and equivalent (a standard UK measure of attainment) in 2010. The music department had six full-time music teachers.

- **School B** was located in West London, with around 1000 students. The school had $\approx 15\%$ having special educational needs, and $\approx 30\%$ obtaining five or more A*–C GCSEs and equivalent in 2010. The performing arts department had two full-time music teachers.

Each school ran a two-weekly timetable, meaning the visits (over the period November 2010 – March 2011) typically covered about six lessons of each particular class. Various secondary-level lessons were included in the study (Year 7 to Year 11, i.e. students aged approx. 11–16).

Observations were conducted by one observer with notebook and pen; to minimise disruption and facilitate access, video/audio recording were not used. Analysis of the fieldnotes was conducted as described in [4] using focused coding followed by thematic analysis. In the following, any personal names of teachers/students that appear are pseudonyms.

3. THEMES OF MUSICAL CONCEPT

A high-school classroom context of course involves negotiation of various types of known and unknown concepts. One can get a first impression of the concepts that are discussed in music lessons by looking at the curriculum specification. [1] However, such a document does not reveal how the discussions might play out in the actual classroom context: which concepts are more easily negotiated through which modalities, how new ideas relate to prior knowledge, and any subtleties in the way teachers and students approach different concepts.

3.1 Musical instruments are easy

Musical instruments, familiar and unfamiliar, were the basis for many discussions in the observations, but were found to be amenable to negotiation through a wide range of strategies: by name, by comparing against other known instruments, by describing physical characteristics, by miming, by showing pictures, or of course by having one in the room to show and/or use. The concreteness of instruments – they are generally physical objects – is of course a strong reason for this, allowing access to discussion of instruments including those from unfamiliar cultures. Indeed, the most difficult negotiation observed in relation to musical instrument was about the more abstract idea of classification into Western orchestral sections, for example why an electric guitar is not included in the string section. Even here, the concepts' anchoring in the concreteness of musical instruments makes them amenable to negotiation.

Musical notes were also relatively straightforward to negotiate, by name ("C sharp") or number ("third fret" or a note's number in a sequence), or by pointing at their position on a keyboard or fretboard. This doesn't mean notes were easy to recognise or memorise – note the recurrent practice of using a felt-tip to mark the note-names on the keys of the MIDI keyboard – but that there were stable commonly-understood ways to refer to them. In our observations, Western 12tet tuning was an unchallenged common ground for note tunings, and we might conjecture that this supported the ease of discussion; although the schools did include some non-Western music in their curriculum, we did not observe any discussion going beyond the Western 12tet scale.

[1] http://curriculum.qcda.gov.uk/key-stages-3-and-4/subjects/key-stage-3/music/, http://www.edexcel.com/quals/gcse/gcse09/music/

3.2 Genre terms are contextual and useful

Genre-type terms were observed in many conversations, used to navigate known and unknown music – both in curriculum-oriented conversation and more informal conversation about music that people like or dislike. In the MIR context this is notable because genre has been a topic of some debate – see Section 5 for further discussion.

The use of genre-type terms has an important role in mapping out a landscape of musical styles and exploring that landscape. Note that the labels do not form a compact or mutually-exclusive set of categories (unlike the "record shop" approach to genre); instead they function more like landmarks, having particular traits which can be discussed and compared against other genres.

The following brief excerpt shows a function of genre in a lesson, as one student shares music with a peer:

> Preston (American, recently new to the class) was sitting at a computer in the corner of the room, next to Terry. He was listening to something on earphones. He offered one earphone to Terry:
>
> **Preston**: Check this out
>
> Terry took the earphone and listened. Preston turned up the volume loud so it was audible in the room. He nodded along to the slowish beat and looked around the room smiling with a satisfied look.
>
> **Terry**: How dyou dance to this
> [Pause.]
> **Preston**: This is car music bro. You just ride around with a fucked-up ass car.
>
> They carried on listening to the music.

Here "car music" functions as a genre term, defined through a trait not of how it is made or its sonic aspects, but of what listeners do with the music.

The excerpt concerns social music sharing rather than a class task, yet the use of genre was consistent in many observations. When genre labels are used in a task set by the teacher, they function as a route in to discussing and finding out about different ways of performing and using music, and thus broadening students' awareness. The labels often don't appear as entirely new concepts, rather as references to musical styles including ones the students may only have a vague awareness of. Thus an important role of genre terms here appears to be to provide named landmarks to navigate the world of known and unknown musics.

Note also that there may be negotiation of musical genre terms – the terms are not universal/objective, but local negotiation is sometimes required to come to an agreed understanding. Hence in one class task, the term "bhangra" was unfamiliar to some students, leading to a discussion resolving its meaning by reference to known terms such as "Indian" and "Bollywood". Although such a comparison might seem inaccurate to some bhangra/Bollywood fans, it helped resolve the term "bhangra" as a landmark useable in further group discussion.

3.3 Nameless rhythms

In contrast to the genre talk just considered, negotiation of rhythm generally occurred without a stable set of labels or ways to refer to different rhythms: rhythms generally were included in discussion only by acting them out – whether on a drum, by clapping, or vocally.

Acting out rhythms is an important part of music education, but discussion can be impeded if there is no shared set of common terms used as shorthand. (Musicologists do have names for many rhythms, e.g. *son clave*; and note durations can be named as e.g. *quaver* or *quarter note*, though these don't lead directly to shorthand names for rhythms.) In our observations we found a general tendency for rhythm talk to be limited by this lack of names, sometimes causing confusion or difficulties in remembering which is which.

The closest to a stable terminology was the "one and two and three and" approach used by some musicians, though even here there was ambiguity, in part because counting can be done at different metrical rates, or the accents can be counted rather than the underlying tactus. For example, on one occasion a teacher talked this approach through out loud, saying "one and two and three and four and" and asking the students, "which number was the 'and' after?" However he became unsure himself, miming playing the drums while saying "one and two *and*" and then "one and two and three *and*", and coming to the decision that the right answer was three. This answer seemed not to affect subsequent use of the rhythm in class, since the rhythm pattern was subsequently negotiated only by performing it, not by referring to any 'and's or numbers.

4. THEMES OF MODALITY

Having contrasted the uses of some different types of musical concept in music lessons, we next turn to consider the modalities used by teachers and students.

4.1 Multimodality

From our observations we found a strong pattern in the technological and non-technological modes that teachers and students use to negotiate music-related concepts: they use a wide variety of modes, both digital and otherwise, in quick succession and often in parallel. The classroom is a rich environment in which a wide variety of resource types can be called upon instantly, without necessarily planning in advance. To give an overview – teachers and students:

- talk about musical concepts verbally, using descriptions, counting, and references to known artists/musics;
- they demonstrate concepts by acting them out using physical instruments, voice, software sequencers, or (surprisingly often) mime;
- they convey concepts by talking someone else through acting them out;
- they call upon resources including posters, physical instruments, smartphones/MP3 players, slideshows, Wikipedia articles, Youtube videos, and web searches;
- and they share specific music pieces by means of headphones, earphones, loudspeakers, singing, and occasionally file-transfer.

This list is an aggregation, but not an aggregation of disparate phases of activity: the prevailing behaviour of teachers and students during music lessons involves using many of these in parallel, even when a task set for students might formally seem to revolve around one specific mode.

One example of a technology incorporated into the resource-rich classroom context is the Interactive Whiteboard (IW) – i.e. a projector screen with a touch interface, and the ability to be written on with digital pens etc. In the UK there was previously special funding for IWs in schools, and they were present in all classrooms observed. However, there was a very strong pattern in the use of IWs, which was that they were heavily used as more "traditional" projection screens and rarely if ever for their touchscreen or digital-pen capabilities. The projected screen was very often used by the teacher to project Powerpoint slides (of task instructions, learning objectives, descriptions of musical concepts), to demonstrate software use (how to fill in a form, or use a music sequencer), and to play videos. Students were often allowed to control what was projected, e.g. in choosing a music video. It was rare for a classroom session not to involve the projected screen: it often served as a focal point (e.g. when playing a video to the class), and also very often as a highly visible place to leave reference information, such as task instructions or a musical scale or chord progression. The projected screen was very commonly used in conjunction with other resources, such as playing back a video while students played along to it using instruments.

There are multiple potential explanations for why the IW's interactive features were not generally used. Teachers and

students both showed awareness of how to use those features, such as by tapping the screen to dismiss a screensaver; so lack of awareness was not a factor here. Rather it seems that the projected screen is easily incorporated alongside other activities such as playing an instrument or writing, while the IW-specific features make demands (such as being close to the screen, and sometimes holding a special pen) which reduce their ease of integration into multimodal activities. Contrast this with Shannon and Cunnigham's study in a class of young children with special needs, in which the largest effect was said to be that IW placement and other factors led to symbolic "ownership" of the IW by the teacher [7]. We did not observe such effects in our study, with students generally as comfortable as the teachers to make use of the IW, but both used its projected screen as part of multimodal activities rather than using the interactive features.

4.2 Youtube

One of the most-used technologies in the classes observed was the `youtube.com` website. (There was some non-Youtube use of internet video, but to a very much smaller extent.) Youtube's breadth of coverage appears to be what supports its thorough integration into classroom practice: students and teachers often searched in Youtube without having checked in advance they would find something relevant, and almost always found a video which satisfied them.

Youtube was used by teachers and by students for many purposes, including:

- playing a song to support a lesson topic (e.g. to demonstrate a musical style);
- playing documentaries about musical topics;
- playing examples of live performance;
- playing a track to work out its chords and/or instrumentation;
- playing a "with-lyrics" video of a track (showing animated lyrics), to work out or sing along to the lyrics;
- playing a track to perform along to (playing instruments and/or dancing);
- playing back old TV/radio adverts (to demonstrate the use of music in them);
- playing background music quietly;
- finding sound effects or soundtrack elements whose audio could be ripped and used;
- and music sharing (playing liked music to others).

There was a strong overlap between teachers' and students' initiation of Youtube for these uses, and a strong overlap in whether the projected screen or a student's individual screen was used for playback.

Contrary to the suggestions made by Webb [9], Youtube usage was generally not oriented around carefully-planned and -structured video-based activities, but as a resource casually integrated into many multimodal activities. A resource treated in the same way was Wikipedia, a source commonly turned to for factual and textual information (as well as web searches more generally). Wikipedia shares with Youtube the features of having a very broad coverage and text search, allowing teachers and students to use it at short notice without having to consider in advance whether material will be found.

4.3 Singing

Singing is used within music lessons, sometimes as the main focus of an activity, sometimes briefly to convey a melody or musical idea. However, the use of singing as a medium is not always straightforward: singing in UK culture can be susceptible to embarrassment and concern with being "out of tune", with specific inhibition at secondary school age [5]. In the following excerpt, in which students were playing/singing along to Coldplay's "Clocks" on a with-lyrics Youtube video, we see how a reluctance to sing can affect the progress of a task which requires it:

> On the screen, Amy had been searching the web and navigated to a webpage showing the lyrics to "Clocks". The Youtube video was still playing (in a background window or tab) but then it ended.
>
> **Jo to Amy/Donna**: Are you guys ready to sing?
> **Donna**: [Pause.] No.
> **Amy**: We need Andrew.
> **Jo**: I'll play it and you sing, we need to practice it.
>
> Jo played the chords, but Amy/Donna seemed unwilling to sing. Corinne (the teacher) came back in.
>
> **Corinne**: Right has the music finished?
> **Amy**: Yes
> **Corinne**: Right let's have a run-through. Toby start with the bass.
> **Toby**: Me?
>
> After a pause, Toby started with the bass. Jo joined in on guitar. Then Amy/Donna sang but very quietly.
>
> **Corinne**: Right stop. Can you guys hear them singing?
> **Jo**: No
> **Toby [loudly]**: No!
>
> Corinne negotiated with Amy and Donna to try and encourage them to sing more loudly. Amy protested that "when I sing loud it goes out of tune". Corinne got the group to do another playthrough, but Amy and Donna started singing then stopped, saying they didn't know where they were in the words.

Beyond the end of this excerpt, the two students offered further reasons not to sing. The multiplicity of reasons given, whether or not they were the main motivations for reluctance to sing, suggest that singing can in some contexts induce confidence issues which instrument-playing generally does not.

However singing is not always so inhibited. In some lessons, students would spontaneously sing together for fun (not connected with a class task). Sometimes the teacher would co-opt this for a learning purpose, while sometimes it would continue separately from the class task.

4.4 Exploration

A theme that cuts across all modalities is that of student exploration. Most classroom activities are unbounded, with students engaged in exploratory and/or creative tasks. This is in part connected to the teaching strategies currently in use; here we are concerned with the implications for technology design.

The casual use of various modalities and resources is part of this tendency towards exploration. For example, the search and browsing features of Youtube, Wikipedia and web search were often used to explore available information, beyond the basic satisfaction of a single search objective. Exploration was also how students engaged with musical instruments, trying out new possibilities (such as the various sounds available on a MIDI keyboard, or what happens when you shout into a saxophone).

It is worth noting that the authorised/unauthorised status of much student activity is ambiguous, in part because of this exploratory mode. Students' actions evolve quickly in interaction with many things around them (socially and physically), and even if one particular action is authorised/-unauthorised by a teacher's intervention, the students' activity very quickly moves beyond that specific action. Even actions which start out as specifically non-curricular (social or undirected) may be co-opted by the teacher.

It is evident that technologies which support broad exploratory activity are more likely to be generally useful, and that the authorised/unauthorised status of activities can only be determined in the particular context in negotiation between teacher and students. There were occasions when exploratory activity caused problems for teachers – such as when students spent more time formatting their Powerpoint presentation than researching musical concepts for it – but teachers often encourage exploratory activity as part of lessons.

4.5 Music sharing

Music sharing has been discussed in the literature most often in terms of social music sharing (e.g. [3]), but of course music lessons are a context in which people share well-known and unfamiliar music with each other. For this reason, and also because we observed non-curricular instances of music sharing in the classroom context, the various modes and meanings of music sharing in music education emerged as a recurrent theme in our analysis.

In the age of the Internet, developments in the music industry have led to the idea of "music sharing" becoming associated with digital circulation of music recordings. In our study, students did occasionally share music with each other or with teachers by sending files electronically, but more often they might share their earphones to share what they are listening to, or sing a melody out loud, or tell someone how to search for a particular artist online. We observed many instances of music sharing, with the most common modes being sharing headphones/earphones, playing tracks out loud, and singing. As noted in the previous discussion, it is often unclear whether specific instances of music sharing are authorised or unauthorised in a particular music lesson, and there can be conversion between the two: teachers often make use of music that students like, to enhance engagement and to connect musical concepts to familiar music.

In our observations, the vast majority of students had mobile phones/MP3 players and earphones with them, so music sharing by sharing earphones could and did happen quite often. Although we were studying the music lesson context and not the students' lives more generally, the casual availability of speakers, earphones and singing seemed to make them the preferred form of music sharing, rather than digital means. Compare this with Laplante's study [6] which emphasises the importance of young people's social networks (both strong and weak ties) in music discovery, though Laplante does not directly explore which modalities are used separating out different possible modes of music sharing.

5. DISCUSSION

5.1 Genre and labels

Genre has been the subject of debate in the MIR community, from foundational genre classification experiments [8] to more recent discussions problematising the "record-shop" model of genre and moving towards more multi-facteted approaches such as social tagging [1] – or towards the abandonment of genre labels in favour of music similarity metrics. The outcomes from this study suggest that the abandonment of genre-type labels would be a mistake, as such labels function as useful landmarks in the negotiation of both familiar and unfamiliar musics. The comparison against rhythm talk is illustrative: the lack of stable labels for rhythms can make discussion unwieldy. (MIR tools to help understand rhythm might help address this, and/or perhaps the use of specific rhythm labels in teaching.)

In this respect the work of Craft [2] accords well with our observations. Craft argues that genre is not an inherent

attribute of a track, but a label that emerges from a person's interaction with it and with their context: "meanings of music, such as the categories into which an individual puts music, are emergent qualities of the music when given social contextualization, rather than merely objective attributes of it" (p. 167). Further, he argues that a situated approach to genre is nevertheless amenable to analysis by MIR tools. Our research supports this position and suggests that such an approach would be more likely to make such analyses useful to real-world contexts such as school music lessons.

5.2 Designing for multimodality and exploration

Our study found that teachers and students predominantly engaged in highly multimodal activities during music lessons. Teachers and students use a variety of technologies casually, often in parallel/combination and without prior planning. Also, most student activity is exploratory in nature, due to both the tasks set by teachers and the students' interactions with their environment. Technologies designed for the classroom must fit with these modes of use: they must be amenable to use in combination with other resources/technologies, at short notice, and ideally facilitate exploration across a wide range of potential topics. They should not be designed as if they will be the focus of uninterrupted attention for long periods, but function as part of the rich classroom environment, often lying latent until needed.

Discussion of technology and education often focuses on the high-tech, but the combination of high- and low-tech must be remembered. Physical musical instruments are of course used in music lessons for various purposes, but also singing, mime and posters are called upon as part of negotiating musical ideas. On one specific topic, we note the issue of students' potential anxiety when asked to sing, at least in the UK context, while singing is an activity that music teachers often want to encourage and develop. Any MIR system that worked with the singing modality (such as query-by-singing/humming, singing transcription) would need to be designed with sensitivity to such issues.

Returning to the idea of open-ended exploration, it may be a challenge to build a system with a breadth of coverage on the order of that of Youtube or Wikipedia. One solution might be to piggyback on larger systems such as Youtube (for example, offfering an MIR analysis of Youtube videos on demand). Alternatively, linked data and the semantic web offer the potential to connect up with myriad large music-related resources, so might provide the infrastructure for a useful resource.

6. ACKNOWLEDGEMENTS

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