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Integration of informal music technologies in secondary school music lessons

Dan Stowell and Simon Dixon

Queen Mary University of London, Mile End Road, London E1 4NS, UK

dan.stowell@eecs.qmul.ac.uk

Technologies such as YouTube, mobile phones and MP3 players are increasingly integrated into secondary school music in the UK. At the same time, the gap between formal and informal music learning is being bridged by the incorporation of students' preferred music into class activities. We conducted an ethnographic study in two secondary schools in London, investigating the roles of technology in the negotiation of musical concepts in music classes. From this, we report some observations on the relation between formal/informal and authorised/unauthorised activities in class, and some specific observations on the role of YouTube, mobile phones and MP3 players in the class context. In the lessons we observed, these technologies functioned as part of a richly multimodal ecosystem of technologies, combining aspects of formal and informal use. This carries implications for how we plan for the use of technology in the delivery of music education.

Introduction

The use of digital technologies in the music classroom is a live issue. Internet video, mobile phones and MP3 players have seen enthusiastic take-up by teenagers and are now widespread (Nielsen Company, 2009). Meanwhile, recent research across English secondary schools raised issues such as the lack of integration of digital technologies with other classroom resources, and questions of teachers' continuing professional development (Savage, 2010). There has been a move to bridge the gap between the technology of the music classroom and that of the wider world (Savage, 2010, and citations within). The 2011 Henley Review of Music Education in England recommended that 'further work should be undertaken to develop a national plan for the use of technology in the delivery of Music Education – and to ensure that the workforce is up-to-date with latest developments' (Henley, 2011, p. 30). More specifically, it recommended studying the use of technology for music education in rural communities (with no explicit motivation, though presumably referring to communication technologies), and 'new methods of creating music that embrace technological innovation' (Henley, 2011, p. 30). The UK government's National Music Plan, published later that year, picked up on these themes, but also emphasised that general-purpose as well as specialist technologies could be useful in music teaching (Department for Education, 2011, esp. Annex 2). Examples given include digital audio recorders, videoconferencing and online video.

Hand in hand with technological developments has been the move to bridge the gap between 'formal' and 'informal' music practices for the benefit of music learning (Folkestad,

2005; Green, 2008; Wright, 2010). 'Informal' practices include those used in learning to make music in non-institutional contexts, but also those used socially in sharing music with friends. The work of Green (2008) represents an important movement in music pedagogy by strengthening connections with and recognition of informal music-making practices. However, Green (2010) argues that '[w]e would benefit from further careful philosophical discussions of the different possible meanings and uses of the terms 'formal', 'informal' and 'non-formal'' (Green, 2010: 91). In that light we should note that the emphasis has largely been on music-making practices considered in these terms, whereas our work includes consideration of music-listening and music-sharing.

In the present paper we contribute to the issues around formal/informal practices and the incorporation of new technologies into the classroom, not as educationalists but from the perspective of music technologists. Our own research is situated in the field of *music information retrieval* (MIR) (Orio, 2006), a discipline which studies the many ways that information can be automatically extracted from music, and how it can be presented for effective search/browsing and musical understanding. We wanted to explore how such MIR technologies might find their place in the music classroom; hence we conducted an ethnographic study of current technologies in the classroom (high- and low-tech), and how they related to each other and to the negotiation of musical concepts. Those of our findings which bear upon the MIR community have been reported elsewhere (Stowell & Dixon, 2011); here we present those of our findings which relate to current educational topics of the adoption/integration of digital technologies in music education, and of the relation between formal and informal practices in the classroom.

In this research our focus is not on a specific curriculum or age, but on the interaction of technologies with music teaching and learning, broadly across Key Stages (KS) 3 and 4. Hence our study involves a heterogeneous set of class groups from two schools, and draws out broad themes relating to current technology and secondary schools.

After describing our setting and methods, we present themes which emerged from our study. We first discuss the relationship between authorised, unauthorised and casual activity – describing a model which bears upon the integration of technologies more associated with informal practices, such as student mobile phones. We then discuss the position of mobile phones and MP3 players in classroom interactions, the use of YouTube, and the interactions between various high- and low-technologies.

Setting and methods

We chose to approach the study with an ethnographic orientation, so as to construct a rich *thick description* (Geertz, 1973) of the way music-related ideas are used and relate to each other in a specific context. The sensitising questions used to guide the study were:

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

The study was conducted in music lessons at two secondary schools in London. The two schools were chosen 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 c. 65% of students receiving free school meals; c. 15% having special educational needs; and c. 50% obtaining five or more A*–C GCSEs and equivalent in 2010. The music department had six full-time music teachers, plus peripatetic teachers. It was a participating department in the Paul Hamlyn Foundation ‘Musical Futures’ scheme (Hallam *et al.*, 2008).
- **School B** was located in West London, with around 1000 students. The school had c. 25% of students receiving free school meals; c. 15% having special educational needs, and c. 30% obtaining five or more A*–C GCSEs and equivalent in 2010. The performing arts department had two full-time music teachers, plus peripatetic teachers.

The research was conducted over the period November 2010–March 2011, and encompassed a variety of KS3 and 4 classes in the departments as well as break times and lunch hours. (Most lunch hours were spent eating alongside staff in a room with various students coming in, asking questions, taking/returning equipment, and were a valuable liminal component of the immersion.) The unit of study was not a particular class, but the general interaction between teachers, students and musical ideas within the schools. A variety of lessons were encountered including Music GCSE lessons in both schools, Music Technology BTEC lessons in School B, and a Year 8 music performance project in School A.

Notes were taken by one researcher with notebook and pen: these notes included conversations, sketches of room layouts and people’s positions/actions, and transcriptions of notices, posters, Powerpoint slides and screen layouts. The researcher was largely positioned in an observer role, but would occasionally assist with lesson topics, equipment, or even playing an instrument. To minimise disruption and facilitate access, video/audio recording were not used. We also chose not to conduct planned/formal interviews, but to focus on a combination of observations and *in situ* conversations with teachers and students. This was partly to minimise disruption but also in order to focus more on the members’ words and actions in the context of use, and also to reduce the likelihood of our visits being perceived as evaluative (cf. Emerson *et al.*, 1995, p. 140; O’Reilly, 2005, ch. 5).

Analysis of the field-notes was conducted with coding and thematic analysis, following Emerson *et al.* (1995). We started with open coding, annotating each small segment of the field-notes in sequential order, entertaining all analytic possibilities. We then collated these annotations and organised them manually by similarity, so that themes emerged from related topics appearing again and again. Each strongly represented cluster of codes was selected as a theme. The strong themes related to the sensitising questions (above) were all selected for the next stage of analysis, which was to go through the field-notes again with a more focused coding based on the themes. This was then the basis of the written report which elaborated on each theme, with field-note excerpts selected to provide the primary structure for discussion of each theme.

The following presents some of the themes which emerged clearly from our analysis. We do not have space to present all themes, but have included those which relate to current topics around formal/informal music, technology and the classroom. All personal names of teachers/students are pseudonyms.

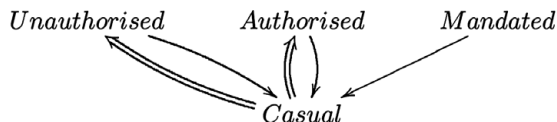


Fig. 1 Movement between different modes of activity. The double-thickness arrows are changes occurring through explicit status negotiation.

Classroom dynamics: authorised, unauthorised and casual activity

Our first theme arising from the data analysis concerns the dynamics of what activity is authorised and unauthorised in class, and how this is negotiated. This is not the same issue as the formal/informal distinction, but it is related: in a music lesson there are often moments of informal music – for example a group of friends singing a current pop song together – and such activity could be incorporated into the lesson, or could be disallowed. The management of this boundary is also relevant when considering specific technologies, such as whether or not mobile phones are permitted.

From our observations of the everyday detail of interactions in music lessons, a strong pattern emerged: there is almost never a clear division between what might be formal and informal modes of activity, or between activity that might be authorised by the teacher and that which might not. A large proportion of students’ time is spent in activities whose status is ambiguous: for example engaging in exploratory or creative tasks, or conversations with others. When the status is negotiated between teacher and student, it is almost never based on a priori categories but emerges from the negotiation of many very local factors – often unpredictable in advance.

There are of course exchanges with the teacher in which the authorised/unauthorised status emerges, and often a teacher will instruct students to do certain things (we will call this ‘mandated’ activity) – but students’ activities evolve quickly through their interaction with learning materials, tools and other people, and very quickly progress beyond the most recent point of negotiation. So most of the time students are engaged in what we will refer to as ‘casual’ activity – not meaning off-topic activity but activity whose authorised/unauthorised status is ambiguous, but could be crystallised by teacher/student negotiation. The flow between these modes of activity is depicted in Figure 1.

As one brief illustration, the following excerpt is one of many in which students spontaneously sing together, in a way not directly related to a class task but for enjoyment. The class is a Year 10 class of about a dozen male students at School B:

The students had mostly sat in the chairs around the edge of the room, at the computers. The teacher (Lauren) said ‘circle!’ to get them to arrange their chairs pointing inwards, in a circular arc nearer the middle of the room. Lauren was still sorting out folders and students, while the students were talking among themselves about various things. Two or three of the students started doing something where they would sing someone’s name in a close-harmony-type chord. One would sing ‘Simooooooooooooon’ and another would join in ‘Simooooon’ and another on top of that. They did this with a few names.

Lauren [Teacher]: I like how that just turned into like harmony, that’s like [...] it’s like barbershop quartet [...] right wait stop

[The students sat around her stop talking/singing]

Lauren: Right do it again

*: What are we gonna do?

*: Garyyyyyyyyyyyyyyyyyyy

*: Garyyyyyyyyyyyyyyy

*: Garyyyyyyyyyyy

Lauren [while the students are holding the note; making eye-contact with a student]:
Right can you do a higher one?

* [squeaky high voice]: Garyyy!

[They stop singing. Laughter]

Here the teacher co-opts the situation to encourage the students to explore singing in a tiny informal activity, and connects it with the idea of a barbershop quartet (possibly why she asks a fourth student to join in). The students' attitude to singing is here playful and social, sitting outside specifically evaluated tasks. The teacher authorises the activity and directs it. In other superficially similar instances, moments of singing might be either unauthorised or left ambiguous. There is no a priori status of such informal activities, but teachers and students are able to negotiate the status as needed.

We emphasise that our assertion of this pattern is not just a relativist refusal to acknowledge a difference between students following and straying from the lesson plan. Firstly, it is not just the teacher who decides what is authorised, but it is often negotiated between teacher and student. Nor is it only activity specified by the teacher that is authorised. Nor is the decision based on general properties such as the mode employed: for example sometimes a visit to YouTube is authorised or mandated, sometimes teachers disallow it.

More fundamentally, though, 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. Further, students are often assigned open-ended and creative tasks, which is important for their learning and their engagement in learning; in such conditions, actions or discussions which have only tangential relation to the formal curriculum topic are very likely, and their authorised/unauthorised status may emerge later after discussion with a teacher, or may never be stated.

The next excerpt shows a rather different classroom context, yet the same issues emerge of technological freedoms and constraints, student exploratory activity, and negotiation between teacher and students about the status of different activities. It is from a Year 10 lesson at School A, in which the main activity is to use a music sequencer to create a beat pattern:

The teacher (Evan) was sitting at the main classroom computer demonstrating to the class something using Logic Pro. There were about 20 students in the room, sitting in

chairs at the computer desks but turned round to watch what Evan was doing (projected on the screen at the front of the room).

Evan [Teacher]: [. . .] so you put your bass drums where you want them.

[Evan clicks in Logic Pro window, then plays back a beat, slightly different to the one he just played before.]

Evan: and you can add in some other sounds.

[Evan clicks in some different rows on the screen, adding a couple of sound effects to the loop that's playing back.]

Evan talked this through a bit more, among other things telling the class to 'keep it simple'. As the beat played back he stood up and went to the projected screen, pointing at the boxes which he had clicked to turn on.

Evan: Hard to see it on this blue screen, hard to see this blue on the screen, but I've put a hihat on each one here [points] so use hihat kick and snare are the basic things you need. [Going to sit back at the computer:] OK so I'm gonna unlock your screens.

Evan sat at the computer and clicked something, and the screens of the students' computers briefly flashed up a big padlock image before clearing to reveal their normal desktops. I hadn't noticed that the screens were locked, but they must have been blank up until that point.

The students loaded up Logic Pro as instructed, getting to a beat sequencer screen with a predefined pattern loaded into it.

Rianna: Sir do we delete what's there already?

Evan: Yeah. [Announcing to all]: Just delete what's there already.

Rianna: Sir how d'you delete?

Evan: You just click and drag.

[Evan goes over to Rianna and demonstrates delete, using the mouse.]

[. . .]

Evan: Get started with the bass drum.

Rianna: Sir the bass what? [.] I started with the [as if an unfamiliar name:] main kit.

A little bit later Evan was leaning over Shanice demonstrating what to do on her screen:

Evan: What kind of drumkit you got? [.] Drum and bass?

Shanice: Yeah.

Gina: Sir how d'you do a [.] beat?

Evan [to Shanice]: So you can put a snare on the offbeats.

Gina: Sir how d'you make it do a beat?

Evan [to Gina]: You click in there.

Gina: Just click wherever.

Evan: Yeah well you [...] see if you can work out where to put it, to make a good beat.

Gina: So we just make a beat?

Evan: Yeah.

After Evan had moved on from this group, Shanice had done something in the sequencer and had passed her headphones to Ashley to listen to the results. Gina looked over at Shanice's screen:

Gina: That's not gonna work.

Ashley [listening on headphones]: No sounds good.

Gina: Is it good? Save it if it sounds good.

[Ashley is nodding appreciatively to the beat, grinning.]

Gina: She's written her name.

Shanice: No I've written S, H, then murrrrrrrrrr.

On Shanice's screen the pattern in the sequencer did look a bit like an S, a H and then some squiggle.

Evan was walking around the class. He talked to some of the students as he did, then to Shanice:

Evan: There that's far too busy.

Shanice: Sir I like it.

Evan: No it's far too busy. Delete some of that.

Evan reached over and deleted most of the sequenced notes for her. Then he went over to Rianna, and talked her through, adding notes to the sequencer, helping her to choose notes and inputting what looked like a very regular beat (one element playing on every eighth note, one on every quarter, etc.), very different from the pattern that had been on Shanice's screen. I noticed that Gina had taken inspiration from Shanice and had written her name in the sequencer screen, quite clearly this time. She was listening through to the sound it made and nodding. She turned to Shanice:

Gina: Listen to that.

[Shanice takes the offered headphones and listens.]

Gina [to Evan]: Sir that's my beat, I've done there.

Evan didn't respond – he was wearing Rianna's headphones and looking at her screen.

Jasmine (who was sitting at a computer on the far side of the room) stood up and walked around a bit. She came over to Gina and took the proffered headphones to listen to Gina's beat.

Gina: That's my beat. Sir that's my beat.

Jasmine: It's quite good actually.

Evan: Let's have a listen. [He accepts the headphones and listens a bit.] It's probably too busy. Have a listen to Rianna's [points at Rianna's screen].

Jasmine [going back to her seat]: I'm gonna write *my* name in *mine*.

Shortly after this, Evan went back to the main computer and clicked to reactivate the screen lock. As the big padlock image appeared on the students' computers they shouted 'Aww!' with a tone of surprise and anger.

The technological means of allowing/preventing activity (the screen lock) used in this excerpt is a relatively blunt instrument, here under the active control of the teacher and used to direct attention towards the teacher at specific points in the lesson.

However, the more subtle interaction is around what kind of activities with the sequencer are allowed or disallowed. In this lesson the students are set a creative task, with apparent freedom apart from the advice to 'keep it simple'. The students who write their names into the sequencer screen are exploring the software in what appear to be actions intended to fulfil the task (they aren't attempting to subvert the lesson), and create patterns that sound interesting to them. However, the loops that these students find interesting to make are clearly not the loops that the teacher wants them to produce, although they are nominally in a position of creative freedom. The teacher progressively clarifies the types of pattern expected, marking some rhythm patterns as unauthorised by judging them (from visual appearance) as 'too busy', by deleting one of them, and by indicating another student's work as a better example.

The circulation of the idea of making a rhythmic pattern from one's name shows a small-scale example of informal learning occurring in class. The excerpt shows a tension between this and the intentions of the teacher – note, however, that we selected this excerpt because the tension leads to explicit discussion which is useful for our exposition. More generally, the school (and the teacher) made wide use of approaches inspired by informal learning considerations.

Both the excerpts presented in this section illustrate occasions where explicit work is done to negotiate the boundary between authorised and unauthorised, regarding student activity that has informal aspects. However, such negotiation is relatively rare in actual classroom interactions; in between these occasions, much activity occurs whose status is ambiguous (we have labelled this 'casual' activity). In the next section, we will see similar issues surrounding mobile phones and MP3 players, with specific instances of negotiation but also periods of ambiguity.

Some of the educational debate in recent years has considered the relation of informal musics to music education, and how they can usefully be brought into the classroom. Our observations offer a slightly different perspective on this. When one looks in detail at what happens in a music lesson, the distinction between formal and informal types of activity (the position on Folkestad's (2005) axis) diminishes, since the majority of activities have no explicit status and almost all activities evolve quickly due to the interactions of participants.

In the following two sections we will consider some specific technologies which we observed to have an interesting role in classroom interactions. They are technologies whose role is more commonly associated with social and informal music listening.

Mobile phones and MP3 players

Our analysis found themes emerging around mobile phones and MP3 players, in particular relating to the authorised/unauthorised status questions discussed above. These devices are a popular vehicle for music audio/video (Nielsen Company, 2009), and they are generally the students' own, brought into the school rather than provided by the school; so they might be considered a key route by which social and informal musics might find their way into the music classroom.

Both the schools studied had official bans on student use of mobile phones. School B displayed this sign prominently in the entrance hall:

*Mobile phones are
not allowed in
[School B]
[icon – a phone in a red circle with a red crossthrough]
If they are seen
they will be
confiscated!!*

However, despite the official prohibition, phones were quite often brought out for various purposes in both schools, for class-related and more social purposes. The following excerpt is from a Year 8 lesson in School A, in which the teacher (Andy) was facilitating a group of six students in a small studio room, learning to play together as a band:

From time to time the students would talk about what 'other' song they were going to play, apart from the one they had been practising.

Brittany: I wanna do a different song.

Keisha: [...] on my phone.

Andy [Teacher]: Oh, you wanna play a new song on your phone? Not right now.

[... later ...]

Andy: I can give you two minutes if you wanna choose your next song. [To Keisha:] Get your phone out.

Keisha got her phone out. Someone suggested holding the mic to the phone so she did that, after starting the track playing.

Andy: One in ten chance it's a rock song.

The track played, audible over the studio speakers, 'Best Behaviour' by N-Dubz. There were some drums, synth strings, piano and some other sounds, plus a male vocal. The drum line included some fairly rapid hi-hat playing.

Andy: How do you play that bit on the drums?

Nashida: I can't play that.

Andy: Yeah you can, I'll show you.

This excerpt reflects a pattern that was common across both schools, of students using mobile phones or MP3 players to introduce their liked music into class. The use of these devices was not barred by teachers but managed, to allow students' music choices to be part of the lesson.

The following excerpt (from a lesson with about a dozen Year 10 students in School B) shows some of the explicit negotiation about the status of mobile phones and/or MP3 players:

Lauren [Teacher]: For the first bit, the first half hour, I'm gonna let you crack on with whatever you need to do, whether it's recording or whatever.

[Alan gets phone out of his shirt pocket.]

Lauren: Put that away

[Alan puts phone back in shirt pocket.]

Kenny: Should confiscate it.

Lauren: Yep. Put it away or it's gonna go.

Alan: Or what?

Later in the lesson:

Lauren [to Terry]: Go and find your original [Cubase file], get yourself a dongle.

Terry walked out, looking at his phone/MP3 and thumbscrolling the touchscreen. Shortly after he walked back in and sat back at the computer. Lauren said to him:

Lauren: Put that phone away.

Terry: 's not a phone. It's used for both.

Lauren: What is it then?

Terry: 's an iPod.

Lauren: OK well.

Terry [defensively]: 's OK isn't it.

Lauren: It's OK for us in Music, but if someone comes in they could try to take it off you, so better hide it.

This was before lunch. The lesson continued after lunch; when the lesson had almost ended, many students were logging off the computers and getting ready to go, some doing things with their phones. A younger student came into the room (Year 8), saw the phones, and asked 'Miss how come you don't confiscate it?', to which Lauren replied:

Lauren: No it's Music here, I have been doing, it's last minute. [...] It's Music, we do it a bit different, they use it for their coursework. [...] You wouldn't do it in English, you'd get it confiscated straight away [...] but this it's Music it's a bit different.

The earlier negotiation about iPod-vs-phone, and the teacher's response to the young student's question, show the active negotiation of the possible boundaries between authorised and unauthorised, as well as between phone and MP3 player. The teacher's response to the question shows a motivation to uphold the general rule against mobile phone use ('I have been doing [...] You wouldn't do it in English') while explaining the apparent contradiction, through two possibly contradictory justifications: either by saying the infraction is minor ('it's last minute') or that phones are allowed in music lessons ('It's Music, we do it a bit different, they use it for their coursework' – though in this instance the phones aren't being used for coursework).

The next excerpt is from the same class group but a few weeks later, in which the class has been set a task to come up with some TV/radio publicity, including appropriate music. The excerpt illustrates further the way phones are pushed to either side of the authorised/unauthorised divide according to subtle local factors:

Kenny was sitting at his computer, with an empty Word document in front of him. He had a touchscreen phone in his hand and was scrolling through something.

Lauren [Teacher]: Right put that away.

Kenny: You can't see me I can't see you.

Lauren: Yeah I can, put it away.

Kenny: You can't see me I can't see you.

Terry: Miss he's looking for the Rock Star image look it's there.

Terry reached over and pointed at something on the phone screen. Kenny shook the phone a bit (not sure why).

Lauren: You can do that on the internet.

Kenny: I'm trying.

Lauren: Put it away.

Terry: Alright I'll pocket it.

Terry took the phone off Kenny and put it away in his shirt pocket. (I think the phone probably belonged to Terry.)

Shortly after, Kenny got his Blackberry phone out and earphones. He played a track back, out loud (not through the earphones). Kenny sang along to it a bit, then stopped the track. Then he restarted it. As it continued to play:

Philip: What you're not using that are you?

Kenny: Yeah.

While playing the track he scrolled down on the Blackberry screen.

Kenny: Oh my god I found it.

He played back the first few seconds of a track which started with a vocal note 'ahhhhhhh', then stopped it. Shortly after he played a third track from his Blackberry, a grime-type track with urban beats and a male vocal. He wrote a line of text in his word document.

Kenny: I'm doing a ravey thing.

Lauren came over to Kenny and read what he'd written, then laughed.

Lauren: What's that, a rave, like so where is it taking place?

Kenny: In a bedroom.

Lauren: In a bedroom? Two guys having a rave in a bedroom?

Kenny: Yeah.

Meanwhile, Keane got up and went over to the group opposite – he gave one student an earphone from his phone and played him something.

Keane: Downloaded it last night bruv. I was trying to get to sleep I was just like, [grins, dances].

In this excerpt mobile phones are permitted as part of the lesson activity, but still there is subtle negotiation needed to keep activity within the realm of what the teacher wants. There appear to be engagement benefits for the students in bringing their own social music practices into the activity.

Further, these practices which the students can bring into the classroom are good ways to facilitate the music sharing that is at the heart of many discussions in music lessons. We observed many occasions in which students used their earphones with their phones/MP3 players to share music privately with others. The above excerpt includes playing music out loud, which can sometimes be considered disruptive (and censored by the teacher) but not always, and not in this case.

Many schools operate 'blanket bans' on mobile phones (mentioned for example in Savage (2010)), but according to our observations these are not quite what they seem. Irrespective of the possibility that school administrations should adopt a more nuanced policy on mobile phones (a debate for the schools themselves), these devices are found in school music lessons in an interesting state of fluidity regarding their authorised/unauthorised status, since they are a useful vehicle for bringing some informal music practices into class. Both teachers and students make use of this fluidity. As Baxter (2009) notes, 'The challenge for the music teacher is to keep abreast of such developments and to find ways of utilizing them for positive means, thus continuing to build the bridge between out of school and in school' (Baxter, 2009, p. 62).

As music technologists, we are interested in modes of music sharing, including digital file-sharing which has received some media attention. In our study it was interesting to note that sharing earphones was by far the most common way of sharing music which we encountered. Our observations concur with those of Bickford (2008) who considers in detail the material culture of MP3 players and earphone sharing. However, Bickford places earphone sharing in opposition to institutional regulations; an additional component which we observed was local strategies that teachers employ to navigate an authorised path between the two.

YouTube

One of the most heavily used technologies in the classes we observed was YouTube.¹ YouTube's breadth of coverage appears to be what supports its thorough integration into classroom practice: students and teachers often searched on YouTube without having checked in advance whether 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. We observed uses 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 rather than a music video), 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.
- 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 (2007), YouTube usage was generally not oriented around carefully planned and structured video-based activities, but as a resource casually integrated into many multimodal activities. (Another resource we saw often used, and treated in the same way, was Wikipedia.) YouTube (as Wikipedia) has the important features of very broad coverage plus a good free-text search, allowing teachers and students to use it at short notice without having to consider in advance whether material will be found.

Indeed, YouTube's broad coverage even within the music domain often makes it the most reliable source of material, as demonstrated in this excerpt in which some Year 8 students and two teachers go to the web to find the chords for a song they want to play:

The group went from the studio through to the Music Office (led by the teacher, Andy) to play back a song to learn. They went to teacher Evan's desk, where Evan was sitting

at his laptop, and asked him to play a song. He was initially using Spotify to search for the song.

Alice: Grenade

Evan [Teacher] [typing]: What.

Alice: Oh can't you spell, it's with an 'E'

[After a search, Evan starts a song playing from the laptop.]

Evan: This is the karaoke version. I haven't got the original.

[Pause while group listens to song, a rendition with no vocals.]

Evan: Who's the drummer in your band?

Nashida: Me.

[Pause while group listens to song more. Evan plays another copy of the same song.]

Evan: These are all karaoke versions.

Andy [Teacher]: What about YouTube?

Evan searched for the song on YouTube, and played it back – this time the original version with vocals. The two teachers (Evan and Andy) discussed what the chords were in the song – were they the same all the way through? Was it a 'loop'?

Andy: The verse is OK but the chorus is a bit tricky.

Evan: D'you want the chords printed out?

Andy: Yes please sir.

Evan searched for the chords using Google, finding a satisfactory result on a website.

Evan: Verse is just D minor A minor.

Andy: OK.

Evan: Chorus is D minor B flat F C.

Andy: Mmm.

Evan: You could do an arrangement of it.

Andy: Yeah.

In this excerpt the teacher Evan starts with Spotify. No-one explicitly says why the karaoke versions retrieved are unsatisfactory – possibly because it's less obvious how the music fits with the words, possibly because they might not be faithful to the original. The principal issue discussed is the chord sequence, which one might think would be evident in the karaoke versions. Whatever the reason, in this case YouTube rather than Spotify is the destination for the successful search for music playback. This is followed by a generic web

search for chord information, a type of information for which the teachers/students don't reach for YouTube.

The above excerpt featured the use of YouTube on the small screen (though as a group activity). All classrooms studied featured a projector screen – an interactive whiteboard (IW) – at the front of the room, and these too were often used for showing YouTube videos. One might assume that video on the projected screen is used primarily by teachers for presenting content to the whole class, while students' video use happens on the small screen. In a different context, Shannon and Cunningham (2009) explore the subtle design factors which can reinforce this division, despite the fact that IWs can be used for multi-party at-screen activities. However, in our study we witnessed many occasions when students used the large screen, sometimes to show something to a large class group but often just because of the conveniently visible screen and/or the loudspeakers attached to that computer.

The following excerpt takes place during a Year 10 class at School B, with the class divided into groups, each learning to play/sing a specific pop song. Most groups had been led out to practice rooms, and one group of five students remained in the main classroom:

Amy, sitting at the classroom computer, opened the web browser to reveal a YouTube page with a samba video on it (from the previous lesson). This was visible on the projected screen as well as on the monitor she was looking at. She searched for something then clicked through to 'Coldplay – Clocks (with lyrics)' and played this video. It played the original song over the speakers while the video (embedded in the YouTube page) showed a blue box with the lyrics appearing in blocks of white text.

Two students (Toby and Jo) came in with electric bass and electric guitar respectively, and an amp each. They set up their equipment in the corner to my right. The group of students was thus:

- * Andrew: sitting at electric piano.
- * Amy: sitting at the classroom computer.
- * Toby: sitting with electric bass guitar.
- * Jo: standing with electric guitar.
- * Donna: sitting perched on desk across the room (near Amy).

Toby and Jo started playing along to the music that was playing on the YouTube video, as did Andrew on the electric piano.

Corinne (the teacher) came in. Andrew played the main progression from 'Clocks' a bit more, then went out of the room with Corinne. Toby and Jo carried on playing it for a bit. Then Jo leant over to Toby to point at a fret on his guitar, telling him to play it (possibly she was showing him what note to play in the bridge). The video on the screen continued to play.

Corinne came back in and told the group to get on because they were going to be assessed. Donna indicated the YouTube video on the IW screen and said:

Donna: I'm looking at the words.

[Corinne walks towards the door.]

Corinne [Teacher] to Donna: You need to be by the computer.

Donna: I can see it from here.

[Corinne exits.]

Toby and Jo were playing the main chord progression from the song again, while the YouTube video was playing back. At one point:

Jo to Toby: Then it goes to the bridge [plays bridge chords].

By this point the YouTube video and Toby/Jo were not playing in time; Amy (sitting at the computer) would occasionally rewind the video, so although Toby/Jo were playing the same song, at this point they were overlapping rather than playing in sync with it.

Corinne came back in and got Donna to sit with her and Amy at the computer. She restarted the YouTube video, encouraging them to sing the words. Toby and Jo played in sync with the video. Amy or Donna might have sung along, but not audibly to me (from across the room). After a bit Corinne went to the door again and called:

Corinne: Right guys?

[Toby and Jo stop playing.]

Corinne: After this time through we're gonna stop the video, you're gonna do it through with the lyrics but no backing. Alright?

Amy: Miss the lyrics are at home Miss. Miss the lyrics are at home Miss.

Corinne: No they're not. [Points at projector screen.] On the screen.

[Corinne exits.]

Toby and Jo resumed playing along to the YouTube video. When the song reached the bridge Toby stopped playing; Jo played the bridge chords and looked at Toby (as if to make eye-contact and/or get him to try the bridge notes). Toby got a bag of sweets out and ate some.

This excerpt shows YouTube used by the students as the source for lyrics and a track to play along to, part of a multimodal activity combining audio, lyrics and instruments. The musicians play to the video as a reference, but one singer occasionally rewinds the video in a way that clashes with the musicians' playing, exerting a slightly disruptive control.

The excerpt also shows some interaction between the big and small screen (both showing the same content), with the teacher requesting that the students sit by the small screen, while a student expresses a preference for sitting looking towards the projected screen – though specific reasons for these contrasting preferences are not evident.

This and the previous example show some of the many and varied uses that teachers and students make of internet video, and how this is facilitated by the exhaustive one-stop shop that is YouTube. It is not just the availability of this video but its ease of retrieval (by text query) that enables these activities. The use of YouTube is in general quite different from that advocated by Webb (2007), who argues for designing tasks around a specific

video. Instead, teachers and students often call up videos at short notice as part of ongoing discussions or tasks.

To summarise, we observed use of YouTube very strongly integrated into the music classroom in many ways, on the small screen and the large screen, deployed by both teacher and student.

YouTube's advantage is not just the provision of on-demand video, but its extremely broad library of content and good text search, allowing for ad hoc use within a class activity. Along with mobile phones and MP3 players, it is a convenient route for connecting with informal listening practices, allowing students to bring their own preferred musics into discussion. This usage probably aligns very well with students' use outside school, although we did not investigate this ourselves. See for example Cunningham *et al.* (2008), who studied a cohort of undergraduate students, finding that YouTube is the dominant use of Internet video in many situations, and that the text search is the most important route in to watching videos.

We note that Savage's (2010) survey of ICT usage in secondary schools does not make mention of these modes of ICT use. YouTube is a free web-based service, and so does not appear in a list of ICT purchases. However, it (and other services such as Wikipedia) should not be overlooked for their role in current music educational practice. Nor should they be omitted from critical discussion of the influence of single large commercial providers on music education. Heavy reliance on a single provider does bring dangers, such as being dependent on the availability and the whims of that provider. This is true even if the provision is not through direct purchase.

However, having emphasised the role of specific recent technologies in the modern music classroom, we next wish to place them more clearly in their multimodal context.

Multimodality: high- and low-tech together

Discussion of technology often focuses on the most recent hi-tech innovations, since they are an area of conspicuous change. Much of our own discussion thus far has had this focus. However, in our study we found a consistent pattern of untroubled integration of a wide range of different modalities with each other, in many different configurations. This included ICT but also posters, felt-tips, post-it notes, mime, singing and more. We have highlighted mobile phones and YouTube in the present paper, but their role as learning resources was not different in kind to the lower-tech or more traditional resources. Generally, they were one of the rich array of resources available in the music classroom that could be drawn upon at short notice.

Examples of this were seen in the sections above: for example when students combined a phone with a microphone and speaker to play music back, or when students played a YouTube video on the IW screen, and used instruments and singing to play along with it.

Various resources could often lie latent for a long time, and be called up at short notice. We observed this in the case of posters: many music classrooms had music-themed posters around the walls, and for weeks we saw no interaction with them at all. One might have concluded they had become unnoticed background for the teachers and students. Then one day, a conversation about composers brought a poster into direct use (in fact it was pulled off the wall and laid on a table). Posters are a type of resource which, like

internet-based resources, allow for this latency because their maintenance cost is extremely low.

We consider the issue of multimodality in this study further in a separate work (Stowell & Dixon, 2011). (See also Kress *et al.*, 2006, esp. Chapter 2, on the thoroughgoing multimodality in a school science lesson.) Here we note that both high- and low-technology appeared to be well-integrated in the classes we observed. Unlike previous studies (Lamont *et al.*, 2003; Savage, 2010) we saw no particular evidence of teachers' lag in ICT skills, which might act as a brake on successful integration. However, there may have been an element of self-selection of technologically confident schools in our study so we do not propose to generalise this particular point.

Discussion and conclusions

In this paper we have discussed technologies commonly associated with informal music practices and their current place in the music classroom, from the perspective of an ethnographic study in two London secondary schools. In particular we have discussed mobile phones and MP3 players, and YouTube. Note that we did not deliberately seek out these particular technologies to analyse, rather their importance in the music classroom context arose from the observations.

In particular, YouTube videos appeared to be well-integrated into music lessons, used by both teachers and students for a variety of purposes. YouTube offers a very broad library of video, including music videos but also many other relevant resources, and a powerful text search which teachers and students use to access video without extensive prior planning.

Recent discussion of YouTube in music education (Rudolph & Frankel, 2009; Cayari, 2011) has emphasised the potential for teachers and students to create and upload videos, entering into the worldwide video forum with their own footage. Such a focus is quite different from what emerged in our study. We did encounter some use of video recording, such as a teacher using a small video camera to record a class performance (which was later shared within the school network rather than globally); but there was much heavier use of *existing* YouTube video, for a wide range of purposes. The use of YouTube to share video recorded in the classroom might perhaps seem more novel than 'merely' using existing videos, and it does hold the potential to convert students from consumers into producers of public musical content. But the use of pre-recorded video, as we have shown, is not some simple passive behaviour: it forms part of various rich activities in the classroom, including analysis and performance practice. This aspect of use should not be neglected. In our study, students' informal music practices around YouTube centred on pop-music videos: official videos and third-party versions such as 'with lyrics' videos.

However, we emphasise that individual technologies cannot be considered in isolation: most teaching and learning activities recruit a range of available technologies and modalities, and the ones we have focused on are but components of the array of resources that both teachers and students deploy. These technologies do not appear on the list of schools' ICT purchases but form an increasingly important part of the system.

The 2011 UK government National Music Plan recommended that both specialist and general-purpose ICT tools could be useful in music education, where appropriate

(Department for Education, 2011, Annex 2). The results of our study support this, with emphasis on the facility with which many teachers and students can incorporate general-purpose technologies into their activities. Considered nationally and within an individual school, then, plans for the use of technology should accommodate not only schools' formalised ICT systems (such as Virtual Learning Environments or specific bought-in software), but also the wider environment of internet-based services, and the technologies used by teenagers and others for informal music experiences. Teacher training may be particularly productive if emphasis is given to transferable skills in modern but general-purpose technologies. Plans should also avoid rigidity in prescribing how technology could or should be used, allowing for teachers' and students' abilities to combine and adapt many different technologies into their everyday activities.

For ourselves as technologists, this research has strongly affected our design decisions. The theme of rich ad-hoc multimodality tells us to design *components* rather than *systems*, in fact components which can lie latent to be called up at short notice in combination with other physical or virtual resources; and to design for exploration rather than for constrained activity plans. (The reader might like to consider these recommendations in relation to recent technologies such as Virtual Learning Environments.) Practically, our design ideas changed from introducing a software application, to providing a web resource that built on top of YouTube to allow automatic chord analysis of any given YouTube video. We created such a resource and trialled it in the schools, and it received a very warm reception from teachers and students (further evaluation is ongoing).

Although we are not ourselves teaching practitioners, we might offer the teacher some suggestions based on our research. Technologies such as YouTube and mobile phones are common in many classrooms, and usually provide no technical means for the teacher to separate their authorised and unauthorised usage. As we have discussed, teachers and students manage the use of such technologies just as they do with more traditional technologies: by exploration and negotiation. We have cited some literature which considers designing lessons around specific videos, or teaching students to produce their own video; but perhaps the more important focus is not on a single video but on the spectrum of available resources, some of which the students bring into the classroom through their informal activities. The teacher might benefit from planning responses to various types of music and video which can be 'co-opted' into a small learning outcome, *without* depending on a specific video, but allowing the selection to be made in the moment. They might, for example, start from a student-suggested video and make use of related videos by searching for other performances, cover versions, tutorial videos, or lyrics videos. Some curriculum topics such as melody or rhythm (though not all) can be related to most musical examples directly. As discussed above, it may also be possible to connect the 'consumer' approach to music video with the 'producer' approach, in a virtuous circle that could build on students' informal practices while empowering them as producers.

The teacher cannot always be purely reactive, of course, and we certainly do not mean to imply that all 'casual' activity should be authorised and included. The music teacher helps the student to appreciate unknown music as well as to understand the music they love; we hold that such technologies can also be recruited to this end.

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Note

- 1 Here we do mean YouTube specifically, and not video or Internet video more generally. There was some non-YouTube use of video, but to a much smaller extent, and it lacked some of the features which we discuss herein.

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Dan Stowell is a postdoctoral research assistant in the Centre for Digital Music at Queen Mary University of London. His PhD (<<http://www.mcl.d.co.uk/thesis/>>) focused on machine understanding of voice timbre for musical applications; his current research topics include machine listening, algorithmic music, live performance systems and academic outreach. He has published algorithm developments as well as work on qualitative analysis for new musical interfaces, and is also an active developer of open-source music software including SuperCollider, Sonic Visualiser and PureDyne.

Simon Dixon is a lecturer in electronic engineering and leads the Music Informatics area of the Centre for Digital Music at Queen Mary University of London. His research focus is the access and manipulation of musical content and knowledge, involving music signal analysis, knowledge representation and semantic web technologies. He has published work on beat tracking, audio alignment, chord and note automatic transcription, classification and characterisation of musical style, and the analysis and visualisation of expressive performance.