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In this chapter, adopting an autobiographical perspective, I reflect upon the use of music technology within English school classrooms during the last 50 years. ~~The chapter~~ illustrates that this has become so important—particularly for creative work—that formal music technology examination syllabi for older students now exist alongside courses ~~which~~ that focus on “traditional” music skills. ~~The chapter~~ also discusses the less positive position of information communications technology within the music curricula for primary school children and secondary students aged 11–14, and offers thoughts on the future of music technology within the English education system. As a backdrop to the discussion ~~the chapter~~ presents a short reflection on music technological developments in society during the ~~20th~~ twentieth and ~~21st~~ twenty-first centuries. The chapter also includes the perspectives of music educators from a wide range of European countries, during the period 2008–2011, on the position of music technology within their own educational contexts.

music technology; information communications technology; English secondary schools; primary schools; school classrooms; European perspectives; sequencing; recording; Ofsted; GCSE examination-

Chapter 02

Technology in ~~Music and~~ Music Education in England and across Europe

Marina Gall

I almost think that in the new great music, machines will also be necessary and will be assigned a share in it. Perhaps industry, too, will bring forth her share in the artistic ascent.

(Busoni, cited by ~~in~~ H. Russcol, *The Liberation of Sound* (1972), p.33).

Introduction

Amplifier, Apple Lossless Audio Codec (~~ALAC~~), compact disc (CD), CD-ROM, commercial music streaming service, crossover, deck, driver unit, drum machine, DVD-audio effects unit, electric guitar, electric keyboard, equalizer, file-sharing service, FX box, genres: (~~Balkan beat~~, ~~dancehall~~, ~~drum & bass~~, ~~dubstep~~, ~~dub regga~~, ~~garage~~, ~~jungle~~, ~~ragga~~, ~~techno~~, ~~trip-hop~~, ~~two-step~~), headphones, Internet, intranet, iPad, iPhone, iPod, loudspeaker, mediaplayer, microphone, MIDI (Musical Instrument Digital Interface), mini-disk recorder, mixer, mp3, multi-track tape recorder, music video games, online audio distribution platform—(~~NuU~~MuU), online social networking and microblogging service, open-source file-sharing application, portable audio and video cassette players; pre-amp, sampler, sequencer, social networking website with an emphasis on music—(MySpace), sound processor, speaker, super audio CD (SACD); synthesizer, tape recorder, turntable, video-sharing website, Web 2.0, website, World Wide Web, **!**

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The above list of instruments, devices, and systems illustrates advancements in music and associated technologies over the last half century through which I have lived as a child, a secondary school teacher, a teacher educator, and a researcher of music technology in education. In this chapter, adopting an autobiographical perspective, I will reflect upon music and technology within English school classrooms during the last 50 years. This will include reference to summative governmental reports on school music, which, in England, derive from regular school inspections ~~named by the Office for Standards in Education~~ Ofsted. I will also draw upon two of my own recent publications (Gall, Sammer, & de Vugt, 2012; Sammer, Gall, & Breeze, et al., 2009; Gall et al., 2012), created in collaboration with educators in other European countries, to present a brief picture of the use of music and information and communication technology (ICT) in schools across Europe. The chapter ends with a discussion of key factors that inhibit the effective use of music technology in formal education in my own country. Throughout the sections about England it will become evident that, despite the government's constant acknowledgement of the importance of music technology within classroom work (Office for Standards in Education ~~Ofsted~~, 2004a, 2013), education policies and/or lack of support from school head teachers have meant that ~~is that the~~ potential of music to enhance and transform learning has not been realized, particularly in music lessons for students aged 5–14. The section that follows provides a backdrop to my personal reflections.

Technology, Music, and Society

From the very earliest days of human existence, men and women have made use of and crafted instruments to support daily life and music-making (Sachs, 2006); “technical” modifications to instruments—to keyboards between the ~~14th~~ fourteenth and ~~19th~~

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nineteenth centuries, for example—have enabled new forms of musical expression (Dolge, 1972). As such, one might posit that there have always been technological developments in music, and that all music instruments are technologies. However, during the period from the 1920s to the 1960s the term “music technology,” as associated with musical instruments, referred to those that were electronically powered. Examples in the popular music domain included electric keyboards, the electric guitar, and the drum machine, all of which strongly impacted ~~strongly on~~ contemporary styles and practices of the time (Majeski, 1990, McSwain, 1995; Schrader, 1982). During this time, music developments went beyond the creation of electronic forms of conventional musical instruments. In both classical and popular spheres, new sound-making technologies, such as the synthesizer, used extensively in the pop world, and the theremin and martenot, exploited within the works of experimental classical composers such as Varese (Risset, 2004), enabled new creative possibilities; as well as composing with new electronic sounds, musicians could actually generate new sounds themselves.

Since the early ~~20th~~-twentieth century, the term “music technology” has also related to devices used within the recording industry (Bloustein, Peters, & Luckman et al., 2008). In this sphere, a music technology is something that ~~not only~~ enables sounds not only to be generated; but also to be manipulated in all manner of ways, and to be stored and distributed easily, thus impacting ~~on~~ the musical processes of composition, performance, and listening (Théberge, 1997; Katz, 2004; Théberge, 1997; Katz, 2004). Indeed, in the late ~~20th~~-twentieth century new musical genres such as techno, house, and jungle emerged that are completely reliant on technology for their realization (Richard & Kruger, 2005); as such, in some cases, the technology is the music.

Ever since the advent of the radio (Juniper, 2004) and music within films (Dickinson, 2003), music has been associated with other media (Cook, 1998). However, the binding together of popular music and visuals was particularly significant in the 1980s, as this led to the creation of a new distinctive cultural (technological) art form: the music video (Kaplan, 1987; Mundy, 1999). Though not specifically classified as music technologies, other new developments are very much associated with music; for example, sound is an important aspect of all video games (Zehnder & Lipscomb, 2006) as well as the focus of some (J. Smith, 2004; Tobias, 2012). The Internet has also given rise to significant changes in music and society over the last half century: ease of access to a wide range of music, including the facilities for downloading of music and file sharing (Werner, 2009) for use on portable personal technological listening devices (Lenhart, Purcell, Smith, & Zickuhr et al., 2010); the availability of free composing and recording software, enabling one person to be composer, producer, and marketer (Théberge, 1997); new ways to learn musical/instrumental skills (Baxter, 2013); and new means of exhibiting one's own music, communicating ideas about music, and presenting one's own personal (musical) image within interactive music websites and social networking systems (Raacke & Bonds-Raacke, 2008; Cayari, 2011; Raacke & Bonds-Raacke, 2008; Cayari, 2011). Within these new cultural and social practices, many people's experiences of music are within multimedia settings (Pfeil, Arjan, & Zaphiris et al., 2008), and often involve considerable collaborative activity (Salavuo, 2006).

Music Technology in English Schools, 1960–1999

So how have such technological tools, and new practices mediated by technology, impacted upon young people and upon music classrooms? I was born in England in 1960;

My earliest contact with music technology was undoubtedly unconscious: my parents owned a radiogramme and, like many adults of the time (Cook, 2010), this formed an important part of our daily home life. My first conscious experiences of music technology were of my mother playing Jim Reeves on 78 rpm vinyl records, and of listening excitedly to the Beatles on the 45-45-inch single bought by my elder brother.

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At primary school, I was lucky to have a specialist music teacher who engaged me in a variety of mainly practical music activities, such as singing accompanied by percussion and recorder playing. At the time, technology was important in this school phase since the British Broadcasting Company's Schools Music Department, set up in the 1940s, ~~scheduled broadcast~~ the radio program, *Music and Movement*, twice weekly (Cox, 1996). Through this, schools lacking a specialist teacher or wanting to enhance their arts curriculum were able to offer dance and drama exercises to music.

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At secondary school, technology supported one of the two main aspects of my classroom music diet: appreciating ~~the~~-classical music (played on vinyl). Technology was also a means by which teachers decided on students' musical aptitude. The Bentley Test (Bentley, 1969), then only available on vinyl, required students to carry out such exercises as determining how many notes were playing in a chord, and which of a number of "bleepy" noises was the highest. At the time, there was disquiet about judgments being made concerning students' musical potential based on one set of tests, for a number of reasons, including the fact that, over time, these ~~analogue~~analog sources become warped and distorted slightly, thereby placing a question mark over the results (Sergeant & Boyle, 1980). Having gained high marks in these tests, I was offered what

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was then quite common: the opportunity ~~of to~~ borrowing a (non-electronic) musical instrument and of ~~having have~~ weekly lessons, all free of charge (Vulliamy, 1976).

As a teenager, although I was highly involved in classical music through instrumental lessons, ~~like most young people~~ “pop” music was at the center of my life and of my being ~~as it is for most young people~~. However, in the 1970s, there were almost no opportunities for any engagement with the technology of the time (keyboards, lead and bass guitars), neither in the classroom nor ~~within~~ school extra-curricular instrumental lessons, despite the fact that these “pop” instruments were most desired by many teenagers (Vulliamy, 1976). This was largely because of the strong emphasis that was then placed upon European classical music and because of the knowledge-based, as opposed to practical, skills focus of school leaving examinations of the time (Spruce, 2002). Thus, like so many of my friends, it was only outside ~~of~~ school that I had opportunities to engage with pop music. Luckily, by this time transistor radios were available and cheap (Christenson, DeBenedittis, & Lindlof et al., 1985), and so again, like many other teenagers, I was able to take control of what I listened to, and when and where this took place (Larson et al., 1989 Fitzgerald Joseph, Hayes, & O’Regan et al., 1995; Larson, Kubey, & Colletti et al., 1989 Fitzgerald et al., 1995). As a consequence, I spent a huge amount of time engrossed in the latest pop music, including late at night when Radio Luxembourg broadcast their “Top 40” charts. My keen interest in the performing arts also led to my membership ~~of in~~ the “sound team” for school productions, ~~in for~~ which I created backing music on a reel-to-reel tape recorder, editing by cutting and splicing tape with a razor blade.

A personal dual musical identity continued throughout my years as a university music undergraduate. Owing to the almost near non-existence of joint arts courses, or courses these with a focus upon anything other than classical music, my three-three-year undergraduate course was almost exclusively focused upon “traditional” music skills, such as aural, harmony and keyboard harmony;⁶ in the evenings I pogoed to punk music.

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It was only as a trainee teacher, in 1981, when I had the good fortune to be allocated as my personal tutor George Odam ~~as my personal tutor~~—a dynamic music educator, who was strongly committed to practical classroom music, including pop and, later, technology (Odam, 2000)—that I was actively encouraged to consider the importance of contemporary popular music and students’ musical preferences in relation to formal music education. As a newly qualified teacher in a tough, multi-cultural, inner-city London school, offering the often disaffected students opportunities to perform popular music in the classroom was hugely motivating. However, practical problems associated with electronic instruments, such as lack of space and good soundproofing, mitigated against their use with anything other than my smaller examination classes. Nevertheless, in the mid-1980s, technology enabled me to make a significant music curriculum change. At this time, teachers in all subjects were permitted to develop their own alternative examination syllabi,⁷ aimed at lower-attaining students (Tattersall, 1994), and so I joined with a number of other local teachers in offering my 14- to 16-16-year-year-old students a course in which they created and recorded a pop music radio program (on cassette tape) as part of their examination work.

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More significant curriculum changes, which directly and indirectly impacted ~~upon~~ the use of music technology in secondary schools, came about in 1986 and 1992 with the

publication of the new (GCSE) examination syllabus for all 14-~~to 16-16-year-year-~~olds (Philpott & Carden-Price, 2001) and the introduction of the orders for the first ever music National Curriculum for England and Wales (Department of Education and Science~~DES~~, 1991). Within both, there was a new emphasis on “music for all”; practical music, including composition (which was rare in some schools to this point), and breadth of style and genre within studies, such that world music, jazz, and pop then became commonplace within the curriculum.⁸ I welcomed this, heartily; although there was a broad framework within which to work, with no detailed government prescription of content we teachers were free to design lessons of our choice.⁹ Despite the growing availability of commercial classroom materials, many teachers created their own units of work and resources; in my case I included projects specifically designed with input from the students themselves, often related to popular music, and including “free” composition.

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By the 1990s, music keyboards were ubiquitous within English secondary music classrooms and were the main instrument used for group composition and performance work, regardless of the style or genre (Wright, 2002).¹⁰ Indeed, at the turn of the century the government inspectorate expressed concern that staff teaching 11-~~to 14-14-year-year-~~old students “overemphasized the use of keyboards to the exclusion of acoustic or vocal resources” (Office for Standards in Education~~Ofsted~~, 2004b, p. 11), yet this was at a time when the revised National Curriculum for Music had included a new requirement for students to use “ICT to create, manipulate and refine sounds” (Department for Education and Employment/Qualifications and Curriculum Authority~~DfEE/QCA~~, -1999, p. 30).

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I first saw a school computer being used for musical purposes in 1989. At an interview for my third secondary school job I was shown around the music department. Opening the door of a tiny music cupboard mainly used for storage of books, I came upon one ~~17-17-year-year~~-old music student—whom I was later to teach—squeezed in at a small desk using Cubase to compose on an Atari. Since the 1980s, the Edexcel Board had permitted students to create compositions using computer or other technologies, most typically electronic keyboards and stand-alone multi-track tape recorders.¹¹ In 1995, it offered a completely new Advanced level examination (for 17- ~~to 18-18-year-year~~-olds) ~~entitled~~ Music Technology. The first syllabus included a number of “traditional” elements but, nevertheless, gave ~~the opportunity for students~~ the opportunity to focus their work on technological aspects of music ~~-making~~ related to sequencing and recording (Carden-Price, Philpott, & Lewis et al., 2002).¹² Despite this major curriculum change and the gradual development of a wide range of university undergraduate degree courses in Britain related to music technology,¹³ teachers were slow to incorporate technology in classroom music lessons. This was unsurprising since, like most music teachers, I experienced the complete lack of availability of subject-specific training in music (Office for Standards in Education Ofsted, 2004a), even though large funds had been designated for in-service teacher development of technological skills between 1999 and 2002 (Leask, 2002). Furthermore, lack of computer hardware and software was characteristic of most music departments throughout the 1990s (Office for Standards in Education Ofsted, 2004a) despite the massive investment in computers in secondary schools at that time.¹⁴ This meant that, for many years, most schools had insufficient equipment to work with for a whole class of 11- ~~to 14-14-year-year~~-olds that often numbered up to 30 (Office for

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Standards in EducationOfsted, 2004a). Those school that did not have sufficient equipment were hampered by the absence of music-specific technical help (Office for Standards in Education, 2004a~~ibid.~~).

Music and Information Communications Technology ICT in English Schools 2000–2013

So what changes have taken place in the ~~fifteen~~ 15 years since I left secondary school teaching and became involved in teacher education? Little in terms of technology and music for children aged ~~5–10~~ five to ten. In primary schools, most teachers are generalists and teach all of the curriculum subjects. As such, they often lack music expertise and confidence in the subject, partly owing to the limited teacher training time typically allocated to music (Hennessy, 2012). These factors, together with the constant emphasis on literacy and numeracy in the primary school, have resulted in reduced time allocations for music within the curriculum (Office for Standards in EducationOfsted, 2013). As such, particularly since 2007, when new governmental financial support for singing and for learning acoustic instruments in the classroom was allotted to primary schools (J. Evans, 2009a), less of a focus has been placed upon music technology, especially for creating music; this is despite the long-standing (outgoing) National Curriculum requirement that pupils should use ICT to “capture, change and to combine sounds” (Department for Education and Employment/Qualifications and Curriculum AuthorityDfEE/QCA, 1999, p. 2/5d). It is difficult not to be muddled by governmental policy when one reads its inspectors’ criticism that between 2008 and 2011 “the use of music technology was inadequate or non-existent in three fifths of primary schools” (Office for Standards in EducationOfsted, 2012, p. 6) and then notes that the

requirements for technology within the primary curriculum ~~were have been~~ ~~are to be~~ removed from the ~~2014~~^{new}, ~~slimmed~~-~~slimmed~~-down version of the Music National Curriculum (~~2014~~) except in relation to listening to music (Gov.UK, ~~undated~~^{n.d.}).

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The change in focus on technology and erosion of time for music within the wider curriculum are not ~~only~~-features of primary education ~~only~~. The only statement about ICT for ~~11- to 14-14-year-year~~-olds in the ~~most recent~~^{new} Music National Curriculum (2014) is that students “should use technology appropriately” (Gov.UK, ~~undated~~^{n.d.}). More worryingly, following the recent introduction of the new examination framework for students aged 11–16—the English Baccalaureate (~~EBA~~^{Aee}), which excludes music¹⁵—fewer students are opting for the subject ([Office for Standards in Education Ofsted](#), 2013) and some schools are completely dropping music from their post-14 curriculum (Forgan, 2013). Additionally, in a number of secondary schools local to me the subsequent impact is a reduction of time for music within the curriculum for ~~11-14 year-olds~~^{11- to 14-year-olds} ([Office for Standards in Education Ofsted](#), 2012, p. 38). As such, in many secondary schools today, music teachers’ energy is focused upon preserving the place of music in schools, a more urgent necessity than a consideration of music technology in the curriculum.

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Furthermore, lack of availability of computer hardware for whole class use in the lower secondary school music lessons with children aged 11–14 is still an issue (Gall, 2013). A recent government report noted that music technology “was inadequate or non-existent in ~~---~~ over a third of the secondary schools inspected” ([Office for Standards in Education Ofsted](#), 2012, p. 6). Yet head teachers and school governors, who nowadays have full control of their budget, have evidently not responded with financial support to

help change the situation since, over the last decade, [the Office for Standards in Education](#) ~~Ofsted~~ ~~have~~ ~~has~~ constantly highlighted the same concerns (2004a, 2004b, 2009).

So what are teachers who are able to work with whole classes of 11- ~~to 14-14-year~~ ~~year~~-olds doing with computer music technology? The answer is mainly using ~~these~~ ~~it~~ to support practical music-making. Over the last ~~ten~~ ~~10~~ years, loop-based music creation software has been a favorite of many teachers owing to ease of use (Cooper, 2007) and its potential to enable the creation of music in popular styles (Gall & Breeze, 2005). I have also seen students offered the chance to develop programmatic music using sequencing software, ~~such as~~ ~~for example~~ ~~sequencing~~ a walk around an art gallery, stimulated by Mussorgsky's "Pictures at an Exhibition" (Breeze, 2009). Another local teacher encourages his ~~11-11-year-year~~ ~~year~~-olds to create their own sounds, which are recorded into sequencing software and become a bank for pairs to use in designing their own soundscapes, ~~that~~ ~~which~~ are then discussed in relation to *musique concrète*. Composing music for an advertisement or creating music to accompany a film ~~is~~ ~~are~~ also a popular ~~activities~~ ~~projects~~ for students of this age (Gall ~~Lazarus, Tidmarsh, & Breeze~~ ~~et al.~~, 2009). However, in England, aside from projects that I have ~~heard~~ ~~read~~ about in journal articles (~~Baxter, 2013; Savage & Challis, 2001, 2002; Challis, 2007; Savage, 2012; Savage & Butcher, 2007; Savage & Challis, 2001, 2002; Savage, 2012; Baxter, 2013~~), I have seen very limited use of technologies for creative activities with 11- ~~to 14-14-year-year~~ ~~year~~-olds other than paired work at computer workstations using sequencing or sample-sequencing software. That this is a national issue is confirmed by the latest triennial government music report, ~~that~~ ~~which~~ suggests that technology should be better used "to promote

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creativity” (as well as to widen participation and make assessment more musical¹⁶)
(Office for Standards in Education Ofsted, 2012, p. 8).

While~~st~~ the use of computers with ~~11-14-year-olds~~11- to 14-year-olds has not been widespread in English schools, other technologies have become more commonplace: at the turn of the century, the development of Musical Futures, a new pedagogical approach to musical teaching and learning in schools, has led to a wider use of electric guitars and drum kits/pads in the classroom. The primary aim of the approach is to enable students to take more ownership of their music-making and to engage with the contemporary music they invariably enjoy outside ~~of~~ school. In groups they are given a song on CD and a range of (preferably) rock instruments, and then, through self-directed learning, they produce their own version of the piece (Paul Hamlyn Foundation~~PHF~~, ~~undated~~n.d.).¹⁷ More recently, the Musical Futures approach has been extended to include music other than contemporary pop, and the website now indicates ways ~~in which~~ to integrate technology into projects.¹⁸ One local school has fully embedded rock music practical work within the curriculum for ~~11- to 14-year-olds~~ 11-14 year olds but in a different way: through the purchase of five ~~Jampods~~JamPods, each of which has a central student mixer linked to up to six “rock” instruments, most often used with headphones, thus enabling the whole class to work in small groups, but in a “silent” classroom (Bristol Post, 2013). Despite the expense of the ~~JamPod~~JamPod, heads of departments with whom I work are very keen to acquire at least one or two sets in order to offer opportunities for more students to engage in “band” work within classroom lessons.

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Interestingly, over the last decade there have been many positive developments in the use of technology in music classrooms for students aged 15–18. In the 1990s, changes to the Edexcel A level syllabus (for 17- ~~to 18-18-year-year-olds~~), discussed above, also impacted ~~upon~~ the board's syllabus for the school music examination for 14- ~~to 16-16-year-year-olds~~ (GCSE) and, by 2000, sequencers, multi-track recorders, samplers, and record decks (for DJ-ing) were permitted for composing and for solo and ensemble performing within both examination syllabi (Terry, 2007). This further impacted ~~upon~~ other examination boards, which followed suit with respect to both GCSE and A level syllabi, although no other copied the creation of a separate music technology A level. At some of the schools with whom I work, the music technology A level has become so popular that the traditional music syllabus is not offered. This accords with governmental findings on the popularity of the subject: in 2011, a third of entries for A level music courses were for music technology ([Office for Standards in Education Ofsted](#), 2012). Furthermore, during the early 2000s, alongside these traditional courses most commonly found in schools, a number of significant alternatives, more vocational in nature, have also emerged ~~such as :~~ [Business and Technology Education Council BTEC BTEC and Reek School](#) courses ([Pearson, 2017](#)), which enable technology to be included in a range of ways within work-related/contemporary music projects ([K. Evans, 2009b](#)).

These curriculum changes have been radical in offering opportunities for students with a broad range of musical skills/interests to engage in formal school examination courses. For years, ~~14-16-year-olds~~ [14- to 16-year-olds](#) have [been](#) keen to utilize music technologies for composing. Indeed, in 2004, a government monitoring project for music reported that ICT was used most “to be creative; with 57% of key stage 4 [14- ~~to 16-16-~~

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~~year-year-old~~ pupils using ICT frequently for this purpose” (Qualifications and Curriculum Authority/QCA/MCA 2003/4, as cited in Mellor, 2008, p. 452) and in 2005 the Edexcel GCSE examination board’s annual report on composing stated: “[t]hose [students] writing pieces that featured technology heavily, such as electronic music and club dance remix, often deserved full marks” (Edexcel, 2005, p. 14).¹⁹ However, recently staff from the 20 school music departments with whom I am currently partnered for teacher education work expressed concern that they have never been able to support students in offering DJ-ing as a performance option because no one in the department has knowledge/skills in this area.

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Technology in Schools in Other European Countries, 2008–2011

Thus far, the focus of this chapter has been on classroom work in England. However, as part of my work within the European Association for Music in Schools (~~EAS~~), I have engaged in research on the use of music technology in schools across Europe. In the first project in 2008, music educationists from 24 countries completed questionnaires on attitudes toward, and uses of, music technology in schools in their countries (Sammer, Gall, & Breeze ~~et al.~~, 2009).²⁰ In the second, authors from 14 European countries each contributed a chapter to a volume in which they reflected upon a wide range of issues related to ICT and music from their country’s/countries’ perspectives (Gall ~~et al.~~, Sammer, & de Vugt, 2012).²¹ In this next section, I will draw upon these two publications to discuss similarities and differences across countries, including England.

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~~(For ease of reading, I will note the author’s name when first introduced, and, thereafter, only the country.)~~

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In all countries the significance of the Internet was apparent, with some noting its use as “a complementary textbook and teaching aid” (Sweden: Scheid & Stranberg, 2012, p. 245; ~~also~~, Norway: Grønsdal, 2012), accessible at home as well as in school (Poland: Konkol & Kierzkowski, 2012). Some countries even relied solely on online curricula, which were seen to enable more student autonomy (Belgium: de Baets & Meyer, 2012; ~~the~~ Netherlands: Arnold, Overmars, & van de Putte, 2012). The Internet was also viewed as a quick means of obtaining a wide range of music for teaching purposes, particularly through the use of YouTube, in which listeners’ experience is enhanced by visual stimulation (Poland: Sammer, Gall, & Breeze, 2009; Cyprus: Savvidou, 2012) and a place for uploading students’ music for display purposes (Sweden: Scheid & Stranberg, 2012). From the chapter writings it would seem that access to these resources using mobile devices is only common practice in Sweden (~~ibid., 2012~~~~ibid.~~). Recording technologies were cited as a means of capturing student performances (Germany: Sammer, Gall, & Breeze, 2009; ~~Ahlers, 2009~~; Belgium: de Baets & Meyer, 2012), mainly for the purpose of self-evaluation (Cyprus: Savvidou, 2012; ~~& and~~ Poland: Konkol & Kierzkowski, 2012). Interestingly, the most recent English governmental report on music in schools 2008–2011 expressed concern that there was under-use of the free online platform NuMu to share and appraise students’ composing and performing work, and insufficient use of audio recording by teachers as a means of assessing and aiding the improvement of students’ work (Office for Standards in Education Ofsted, 2012).

Another suggested use of technology was to support the development of what I have previously termed “traditional skills,” including: ear training (Poland & Switzerland: Sammer, Gall, & Breeze, 2009; Cyprus: Savvidou, 2012; Italy: Biasutti,

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2012); musical listening and appreciation (Estonia & Slovenia: [Sammer, Gall, & Breeze, 2009](#); Belgium: [de Baets & Meyer, 2012](#)); analysis (Lithuania: Jautakyte, 2012); information retrieval from the Internet (Estonia: [Sammer, Gall, & Breeze, 2009](#); Austria: Höfer & Reubenz, 2012; Italy: [Biasutti, 2012](#)) especially in relation to the history of music (Slovakia: [Sammer, Gall, & Breeze, 2009](#); Norway: [Grønsdal, 2012](#)); notation (Germany & Poland: [Sammer, Gall, & Breeze, 2009](#)); and score writing skills (Cyprus: [Savvidou, & Italy: Biasutti, 2012](#)). One of the most novel uses of technology to support musical learning was cited in relation to work in Finland, where video conferencing is used to support classroom and individual instrumental teaching within schools situated in remote areas of the country ([Finland: Myllykoski, 2012](#)).

As might be expected, in every country the use of technology in relation to the development of musical skills was seen to vary according to the perceived significance of each skill within the cultural context. For example, technology supports vocal work in Slovakia and dance in Poland ([Sammer, Gall, & Breeze, 2009](#)); and is used in relation to performing popular music in Sweden ([Scheid & Stranberg, 2012](#)). Indeed, music educationists from three countries expressed their unease that technology could undermine the “core” classroom activities of singing and group music-making (Estonia, Slovakia, & Slovenia: [Sammer, Gall, & Breeze, 2009](#)).

In both publications the focus on composing that exists in England was not apparent in many countries, despite the fact that, within the research by Sammer, [Sammer, Gall, & Breeze et al. \(2009\)](#), composing and arranging were cited most often as skills developed through using technology. Data from almost all countries suggested that, as in England, the chief inhibitors to creative work in the classroom in the period 2008–2011

were the shortage of computer hardware, especially for use by non-examination (larger) classes, and the lack of training for teachers to feel confident and competent in supporting learning with technology in the classroom.

And the Future? 2014 Onwards

While a number of the points that I raise in this final section may also relate to ICT and music in schools across Europe, I now return to some over-arching thoughts about music technology in formal education in England and my concerns about the future. It feels as if music technology in schools has been caught up in a vicious cycle: inadequate pre- and in-service training has resulted in many school music teachers lacking confidence or competence and, as a consequence, interest in ICT and music; a shortage of equipment for whole class use has then led to further hesitation in bringing technology into music lessons and a disinclination to develop new skills and awareness in this area of classroom work, especially with children under the age of 15, that is, in non-examination classes. The result is that many teachers remain unskilled and under-confident (Gall, 2013).

Sadly, music's low status position within the curriculum (Forgan, 2013) means that we are unlikely to see more money being allocated to music departments for new technological devices, despite the government's awareness of the likely impact: "music technology is changing rapidly and the schools found it difficult to develop their own resources in line with the quality of equipment which students were seeing—and sometimes using themselves—outside school. Consequently, ICT in school could appear dated to them." (Office for Standards in Education Ofsted, 2009, p. 34). This should be a matter of concern for all music educationists in a country ~~in which~~where

student disengagement in school music has been recognized for years (Lamont, 2002; [Office for Standards in Education Ofsted](#), 2013).

Paradoxically, sophisticated mobile phones, which enable a range of multi-media activities, are invariably in great supply within most English classrooms since many young people own them. Yet, ~~whilst~~ while certain teachers have exploited these in school music lessons (Baxter, 2007), this is rare, since most schools' policies completely forbid mobile usage within lessons (Stowell & Dixon, 2014). Furthermore, although many students own or have access to iPads at home, in many secondary schools with which I work there is not even a central supply, let alone a set accessible for regular music classroom work. The availability of such a resource would overcome a key problem that pertains only to music and ICT: the typical lack of space to enable work with acoustic instruments (or drum kits ~~and~~ electric guitars, which ~~that~~ are often housed in annexed practice rooms) at the same time as with computers ~~and/or~~ other technologies (Gall, 2013). Furthermore, one of the government's key foci for more effective use of music technology in schools is "as a tool for inclusion" ([Office for Standards in Education Ofsted](#), 2012, p. 42); iPads nowadays not only offer a wide range of musical programs and software, but also act as an easily accessed sound palette for exploration by students, including those with severe physical disabilities (DM Drake Music, [undated, n.d.](#)).

Effective use of ICT to support musical learning is not, however, merely an issue of equipment availability and/or teacher expertise. The above discussion has touched upon the significance of students' use of technology outside school. It is axiomatic that extra-curricular work in music is important in skills development, yet, as I have discussed

earlier in relation to pop music in schools in the 1970s, children's musical activities ~~outside of~~ formal education often not only differ from those in school classrooms but are at odds with them. Firstly, in children's lives outside school, work on one task often includes engagement with a variety of modes of learning, involving multi-tasking "hands-on" approaches with, often ~~times~~, rapid movement between different modes and tools; this is at odds with the more linear learning traditionally experienced and expected in school. Secondly, staff interested in considering new approaches to student learning more in sympathy with children's out-of-school practices may be hindered by examination requirements ~~which that~~ not only tend to be conservative in nature, but, in the main, focus upon the achievements of the individual; this is inconsistent with the networking, sharing, and co-construction of knowledge that typify not only children's engagement with technology in their own time but also professional practice in music and the arts (Sexton, 2007). Moreover, outside school, children often experience music within multi-media settings (Pfeil et al., 2008), yet most English secondary schools organize learning in relation to separate "subjects." Therefore, at a time when the ~~latest~~ new English National Curriculum (2014) (Gov.UK, ~~undated~~ n.d.a) makes no mention of media or multi-media contexts and "English schools are hounded by league tables of exam results" (K. Smith, 2004a, p. 90), music activities within authentic multi-media settings and other classroom music innovations are less likely to be seen than established practice that teachers feel confident will support the attainment of high grades.

In light of the above discussion, it is ironic that recent governmental reports have remarked that "best practice" regarding technology in music classrooms occurs when teachers relate students' work to how ICT is used in the real world so that students can

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explore processes used professionally ([Office for Standards in Education Ofsted](#), 2009). Many of the underlying structures and policies that underpin formal education in the ~~21st~~ twenty-first century are the chief inhibitors to these “real world” practices. If there is a true concern to help teachers overcome the problems of inadequate or ineffective use of ICT and music in classrooms noted regularly in school inspection reports ([Office for Standards in Education Ofsted](#), ~~2002~~, 2004a, 2004b, 2009, 2012), a major shift in school culture and established practice will be required. This is unlikely at a time when the place of music in schools ~~is~~ is itself in question. However, it is my personal hope that the popularity of music technology as a school examination subject, the huge rise in numbers of students taking music technology-related undergraduate courses (Boehm, 2007), and the importance of the music business—much of which revolves around technology—as a chief revenue provider for the United Kingdom (Anderton, [Dubber](#), & [James et al.](#), 2013) might leverage educators’ attempts to retain music’s place within the secondary school curriculum.

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Notes

¹ The epigraph is from Russcol (1972, p. 33).

Endnotes

² Reports, made available to the public via a website, follow visits to schools, made with very short notice. Failure to gain either a Good or Outstanding grade leads to further visits; continuing low standards can result in the dismissal of school staff.

³ Throughout I write “English,” although I call myself “British,” because the education systems and school music are not the same in all countries of the United Kingdom.

⁴ See ~~<AU: pls. provide author, title, and date of each item cited here or otherwise clarify what it is>~~ <http://histelo.com/act/dance/les/cou/eng/sdle-mam.html> for more information on the broadcast, and <http://www.whirligig-tv.co.uk/tv/memories/snippets/snippets7.htm> for a sound recording of one of the programs. See Historical Boys' Clothing (2004) English Schools Dance Program: Music and Movement for more information on the broadcast and Giles, A. (n.d.) Whirligig Snippets for a sound recording of one of the programs. If you wish these changes should the following also be added to

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~~the Reference section as follows (I have added them above):~~

~~Giles, A. (n.d.) Whirligig Snippets. Retrieved January 28, 2017, from <http://www.whirligig-tv.co.uk/tv/memories/snippets/snippets7.htm>~~

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~~Historical Boys' Clothing (2004) English Schools Dance Program: Music and Movement. Retrieved January 28, 2017, from <http://histelo.com/act/dance/les/eou/eng/sdle-mam.html>~~

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⁵ The other was singing British folk songs.

⁶ Practical activities happened “outside” of the course, and it was only during my time at the university that composition was introduced as a possible area of study.

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⁷ ~~Called For the~~ Certificate of Secondary Education (~~CSE~~) Mode 3.

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⁸ At this time, a typical lesson for students aged 11–14 focused on performing or composing tasks, with students working in groups of ~~3–6~~^{three to six} using music keyboards and/or voices and/or acoustic (including Orff) instruments.

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⁹ This continues to date.

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¹⁰ The National Music Council (~~NMC~~) reported that, in the United Kingdom in 1997, more money was spent on keyboards than on any other instrument (National Music Council~~NMC~~, 1999).

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¹¹ Schools choose from three ~~government~~^{government}-regulated, examination boards

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~~(<AU: pls. spell out ACA and OCR>AQA, Edexcel, and OCR. AQA is~~

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~~Assessment and Qualifications Alliance but no-one in the UK will know this as it's never referred to as anything else than AQA.~~

~~The same applies to OCR which stands for Oxford, Cambridge and~~

~~Royal Society of Arts. (I didn't know either of these myself!) So~~

~~I suggest you leave AQA and OCR.)~~, who set their own syllabi and

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examinations; the requirements of these vary, but in each there is the same focus upon active music-making that is found within the National Curriculum for younger pupils.

¹² At the same time, computer music notation software was being used by students on the traditional A level Music course, who were required to submit a score of their compositions.

¹³ Boehm (2007, p.10) notes that, in 2007, there were 351 in the category of music technology (although only 131 included “music technology” in the title)2007.

¹⁴ Most schools created centralized computer suites which that were primarily used by teachers of subjects other than the arts, partly because they did not include the associated equipment, such as high-quality sound cards and music (MIDI) keyboards.

¹⁵ Students must achieve in mathematics, English, the sciences, a language, and history or geography.

¹⁶ By: significantly improving the use of music technology to record, store, listen to and assess pupils’ work; placing greater emphasis on pupils’ musical development through the use of technology – with the acquisition of technical skills and knowledge supporting, rather than driving, musical learning [and] making more creative and effective use of music technology to support performing and listening work (Ofsted 2012, p.8).

¹⁷ This methodology is now widely known in England. It is difficult to know how

widespread its use is, although many teachers (including those from countries outside England) network within their website, and a number of the teachers with whom I work include one or two Musical Futures projects within their curriculum for 11- to 14-year-olds.

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¹⁸ See [Paul Hamlyn Foundation PHF \(undated n.d.\)](#) for a range of resources.

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¹⁹ This was in relation to one assessment criterion: “use of technology”; grades were also allocated to a number of other criteria for each piece.

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²⁰ Austria, Belgium, Croatia, [the](#) Czech Republic, Denmark, England, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Norway, Portugal, Scotland, Slovenia, Spain, Sweden, Switzerland, and the Netherlands.

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²¹ Austria, Belgium, Cyprus, England, Finland, Germany, Italy, Lithuania, Norway, Poland, Slovenia, Spain, Sweden, and the Netherlands.

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