

Where do we go from here?

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Abstract

The two authors are involved in ground breaking work in Scotland, developing the introduction and use of new technologies in teaching and learning in secondary schools. This paper addresses the major issues and initiatives relating to the use of new technologies in Scottish secondary schools and further education colleges.

Quality of Music Education in Scotland

As a small nation with a population of approximately 5 million, Scotland has long prided itself on the quality of its education system. Curricular overhaul from the late 1970s onward has resulted in a major reshaping of both the structure and the content of the curriculum in primary and secondary school sectors (Scottish Education Department, 1997a, Scottish Education Department, 1997b, Scottish Office Education Department, 1992). Clearly not resting on its laurels, another major overhaul of the system began in 1996 (HSDU, 1996) and is being phased in over the years to 2002. Higher Still (HSDU, 1996) provides new pathways and choices for both academically and vocationally oriented school and college students and, in Music, draws upon the findings of a thorough curricular audit (SOEID, 1998) of existing provision and approaches in over 150 music departments in secondary schools since 1986.

Achievement for All

The adoption of a music curriculum which places emphasis on achievement for all students (SOEID, 1996) has created an environment in our schools in which talent and interest in a variety of musical genres can be allowed to flourish. Pop, Rock, Jazz and Traditional musics now exist happily alongside music of western

European style as well as music from around the world. Provision of instruments such as drum-kit, electric and bass guitars, together with electronic keyboards in the classroom have contributed greatly to the 72% increase in the numbers of students sitting the national music examination, Standard Grade Music, (Scottish Examination Board, 1988) from 1991 to 1996 (Byrne & Sheridan, 1998).

Technology in the music curriculum

In Scotland, the introduction of Standard Grade Music in 1988 (Scottish Examination Board, 1988) had implications for the use of new technology in the delivery of the new course but teachers were left very much to their own devices with regard to level of resourcing, standards of equipment, software etc., and methodologies and approaches. Some teachers were very familiar with the use of synthesisers, computers, sequencers and keyboards for example, while others were more comfortable with the piano, manuscript paper, pen and pencil. There followed a battle for the hearts and minds of teachers, led by a handful of imaginative teachers and advisers, encouraging music teachers to abandon the approaches and methods that had worked successfully for the gifted few and to embrace the philosophy of *Music for All* (Consultative Committee on the Curriculum, 1984).

One of the architects of the new Standard Grade curriculum, Mark Sheridan, recalls that, in 1984, the small group of teachers and advisers who led the push for change identified individuals who were making imaginative use in the classroom of the new opportunities afforded by the forthcoming re-designed curriculum (Sheridan, 2000). Although no specific focus on technology was identified or promoted, many of the contributions to the Occasional Paper series published by the Consultative Committee on the Curriculum contained specific recommendations on what should be included in Standard Grade music. Reports on classroom projects such as the tape recording of groups of students performances of rock music and articles about the logistics of using keyboard ensembles in the classroom were invited from those practitioners who were considered to be leaders in the field (Sheridan, 2000).

The recommendations of these pioneering teachers reflected what was considered to be good practise in the classroom but contained no formal guidelines on the content of the curriculum.

The Impact of Technology

The increasing use of MIDI Sequencing and self contained keyboard workstations has led, inevitably, to a greater reliance by teachers on these tools as means of producing and assessing students' own compositions and arrangements. However, there is, as yet, little evidence that teachers have fundamentally changed their approach to teaching these skills using computers and

workstations as important learning and teaching tools. In England, inspections of schools have revealed that teachers often miss the opportunity to utilise "composing software of high quality, which could be used effectively to help ... pupils develop and notate compositions that they are producing in groups..." (Mills, 1996, p. 12). We know of music departments where most pupils are not allowed access to computer workstations and one where no computers are used in the music classroom at all.

Enlightened teachers should be asking whether skills such as short term memory, audiation and responses to short musical stimuli could be enhanced by the use of computers. The classrooms of Scotland are the research grounds for the creative and effective use of new technologies in teaching and learning. Short composing tasks can be built around a few simple tracks on a sequencer which can act as a 'scaffold' (Wood, Bruner & Ross, 1976) upon which students can build their own composition. An example of this might be using the first few bars of Bach's Prelude in C major from book 1 of the "48" to provide a chord scheme which is recorded onto one track of a sequencer. Students can build upon this material by adding layers, creating new bass or melodic lines and continuing some of the initial ideas. The end result should sound quite unlike the original stimulus but the student will have, nevertheless, created something new (Byrne, 1994).

While there is an obvious temptation to use computers as paper substitutes because students can access huge amounts of information without having to buy the book, there is a danger that the type and level of activity is carried out in the electronic domain simply because it can be. Brooks (1997) has observed that "many teachers believe that replacing text with pictures and other media will bring about much better student learning. Rarely is this intuition supported by research" (Brooks, 1997, p. 12). There needs to be some intrinsic benefit to using technology that can not be achieved by other means. For example, if a child has to access a web page to learn how to put a clarinet together then she may be in the 'chicken and egg' situation of being able to play the instrument but not able to gain access to the correct expertise in order to learn how to carry out this task independently. Alternatively, if she cannot yet play the clarinet, why would she need to know how to put one together? Knowing something for its own sake so that we can later pass an examination seems to characterise the concept led approach to music. While the process of acquiring this type of 'inert' knowledge (Scardamalia & Bereiter, 1985) may well provide some students with an opportunity to succeed, for many it is also an opportunity to fail (Clarke & Haworth, 1994). The projects described in this paper have been planned and developed with the learner in mind in order to provide useful learning experiences and opportunities for success. These projects "keep the learners' brains running in high gear whenever possible; make learners work; keep learners active" (Brooks, 1997, p. 12). The technology is used as a unique teaching and learning tool in providing resources and activities for teachers and students. (Sooner or later, teachers will have to embrace the idea that the technology also belongs to the learner and not only the teacher.)

Higher Still Music CD-ROM

During 1998 and 1999 a team funded by the Higher Still Development Unit and the Scottish Office Education and Industry Department (now the Scottish Executive Education Department) produced a CD-ROM which aimed to serve many of the development needs of teachers and lecturers resulting from the introduction of the new Higher Still pathways of courses and units, Scotland's national examination system for school and further education college students (Higher Still Development Unit, 1997). The CD-ROM "Effective Music Teaching" (Higher Still Development Unit, 1999) illustrates and exemplifies many of the findings of *Effective Learning and Teaching in Scottish Secondary Schools* (SOEID, 1998). It also provides a clear framework to help departments develop a reflective and valuing culture, includes suggestions on teaching and learning resources and addresses issues raised by the *Effective Learning and Teaching in Scottish Secondary Schools* report (SOEID, 1998). Also included are training materials to address staff development needs arising from the introduction of Higher Still as well as sections intended to stimulate debate on the role played by music education in the overall development of the individual learner, including the development of core skills such as problem solving and planning and organising.

The CD-ROM provides valuable exemplar materials, sound files, MIDI files and video clips which will not only have considerable staff development benefits to teachers, but will also act as an invaluable resource for students sitting music examinations at all levels of Higher Still from Access to Advanced Higher. Although, for copyright reasons, only one copy was issued to each examination centre, it quickly became apparent to many teachers that the CD-ROM was indeed a valuable classroom tool and that multiple copies would be highly desirable. It is worth noting in this regard that music teachers can be resourceful, ingenious and sworn to secrecy!

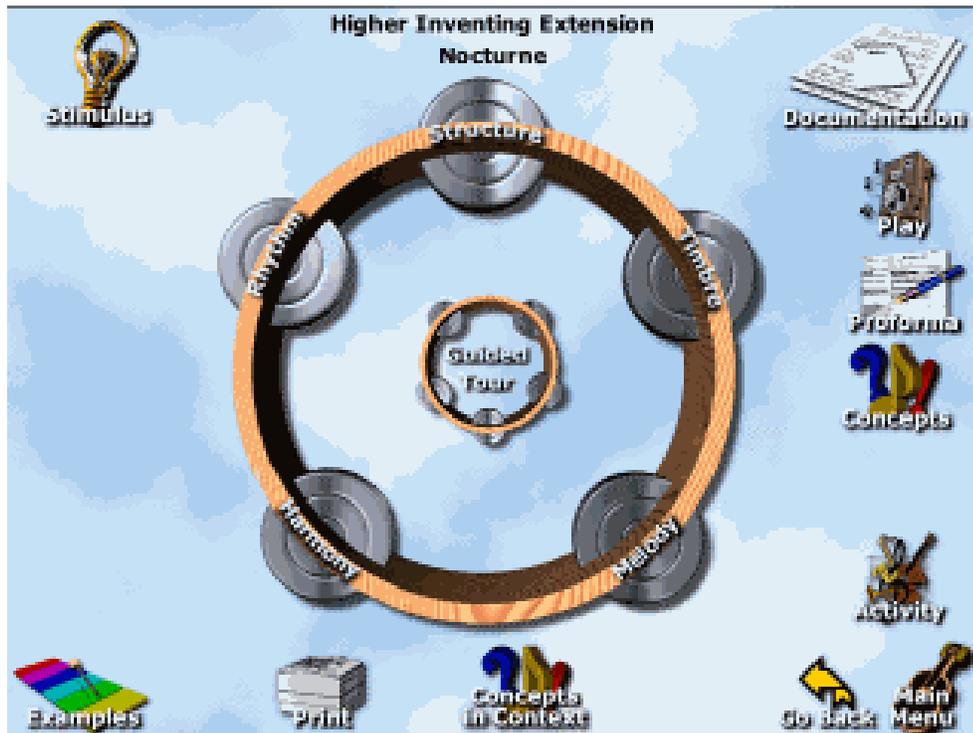
Four specific uses of the CD-ROM as a learning and teaching tool are discussed here;

1. Exploding compositions
2. Exploring musical concepts through the Performing Inventing and Listening core unit
3. Exploring concepts through the concepts in context list
4. Responding to exemplar material

1. Exploding compositions

'Nocturne' is a student composition intended to provide both teachers and students with a view of how certain students approach compositional challenges. There are two ways into each composition example - a global view or guided tour (centre icon on screen) and a parametric view through each of the assessed elements of composition (around tambourine).

Figure 1



Students and teachers can access the exploded view of the composition to see how the students approached the challenge of composing that particular piece.

The 'Stimulus' section allows users to see how the project was set up and to access the exploded view of the composition. The 'Guided Tour' contains hypertext which allows immediate access to relevant parts of the piece as discussed in the text.

'Documentation' allows access to scores and/or performance plans which can be followed whilst listening to an audio file of the piece. 'Concepts' allows access to information on how musical concepts, as detailed in the Higher Still unit guidelines, are exploited in the piece. Again there is audio back up to the definitions contained in the text.

2. Exploring musical concepts through the Performing, Inventing and Listening core unit

'Tin Horns' is an example of students working at the Core Performing, Inventing and Listening (PIL) Unit of the Advanced Higher. This is essentially for teachers only as aspects of planning courses and different methods of learning and teaching are shown.

This takes the user through one method of planning a unit of work in which each activity is built around the same piece of music. Students explore the contrapuntal texture of 'Fugue for Tin Horns' through listening and performing. One of the compositions is an example of a student learning how to deploy concepts first discovered through the group performing activity. The student's own Course Log shows how understanding of a number of concepts is being developed through these activities.

3. Exploring concepts through the concepts in context list

This example, 'Stringbiosis', is essentially for students and provides them with text and audio definitions as well as sharing information on concepts being used in compositions composed by other students. Accessing the term 'Alberti bass', for example, gives a text definition which includes a hyperlink to an audio clip. The student piece 'Stringbiosis' makes extensive use of Alberti bass and the user can look at and listen to specific examples from within the composition. Teachers could make good use of the facility to examine, with students, short extracts of compositions and to look carefully at the techniques deployed. These can act as models for further exploration and new compositions.

4. Responding to exemplar material

In this section, exemplar material, in the form of video clips of students' performances, can be viewed and analysed by perspective examination candidates. Students can develop critical skills which should in turn help them to be reflective about their own performances and development in accompanying soloists. The user can type in comments and then compare their own observations with those of an 'expert'. At end of the process, comments from both student and expert can be printed. This activity is designed for both teachers and students since standards for assessment procedures can be ascertained which could help ensure that teachers are applying appropriate criteria and standards during the formative assessment process during the course.

Core skills

Information on research in creative thinking (Webster, 1988, Sternberg, 1988, McGuinness & Nisbet, 1991) and planning and organising (HSDU, 1996) is also included with much information, which will be new to many teachers, on learning and development (Vygotsky, 1976, Fishbein et al, 1990) and powerful learning environments (DeCorte, 1990). Sections on mind mapping (Buzan, 1974) and thinking tools (de Bono, 1976, 1982) have also been included to help teachers learn to establish creative environments in which students can compose and improvise.

The SCARLATTI Project

In April 1997, the SCARLATTI Project was established by two researchers at the University of Strathclyde (Byrne & Sheridan, 1998). This is an action research project intended to help identify strengths and weaknesses in the teaching of Composing and Improvising in Scottish secondary schools, an area which has been perceived by teachers as being problematic. The accessing of information and materials via an electronic discussion forum on the World Wide Web is seen as an important part of the project and early indications suggest that teachers value the novel approach to composing lessons which are being exemplified by the project team. There is evidence that many teachers are downloading the materials from the web site but very little feedback from those who have actually used the composing lessons in the classroom.

The materials are presented as a series of problems and related tasks on the World Wide Web requiring short responses from pupils. Guilford has observed that "...problem solving and creative production are essentially the same kind of major operation..." (1967, p. 313), so the steps in the lessons are designed to elicit responses which focus on students' problem solving capabilities within musical tasks. The lessons serve as a model and provide scaffolding which students can use to develop their level of ability, bridging Vygotsky's zone of proximal development (Vygotsky, 1978) and can be worked through by pupils individually and at their own pace. Teachers should offer support and advice, taking care to focus on the parts of the process and not simply viewing each lesson as a step toward the completion of an inventing folio. It has been argued that Scottish teachers are more interested in students passing the examination syllabus than they are in developing general and musical skills that can be used in later life (Byrne & Sheridan, 1998). These lessons have been designed to provide teachers and students with alternatives to the most popular composing activities such as 'Melody over chord progression', 'Composing Pentatonic melodies' and 'Blues scale improvisation'. Of course, the result of each process may well be a new piece of music, which is fine, but we would caution against assessing the composition against end of course criteria. Can you imagine how you would feel if, during your first driving lesson, an examiner was hiding in the back seat?

Although the Spider's Web Composing Lessons use conventional notation to represent pitches and rhythms, sound files are also included in two lessons to provide additional points of reference for students. We deliberately place no emphasis on children being able to write down their compositions in conventional form in a conscious effort to move away from the paper and pencil type of exercise that we have observed in some classrooms. Just as Salaman (1997) has argued that keyboards should not be used as yet another means of teaching musical notation while asking "what *musical* purpose staff notation serves in the lives of average pupils" (Salaman, p. 148), we are convinced that composing should not be a paper based notational exercise. The novice composer should have access to a sound source while composing and these lessons are practical activities during which children should make use of their preferred instrument.

The first lesson in the series encourages critical responses from students, asking them to make decisions on rhythms and melodic ideas using very few pitches. 'Pattern Duet', the second lesson, encourages students to layer different melodic strands together and to create accompanying ostinati patterns. The third lesson, 'Happy Birthday Mr Smith', unashamedly takes its inspiration from Ryuchi Sakamoto's wonderful theme from 'Merry Christmas Mr Lawrence' which is quite popular in Scottish schools in an arranged version for classroom ensemble. Both pieces make effective use of a limited range of notes and provide some interesting chords which are a change from the usual three or four chords found in many classroom arrangements. 'Happy Birthday Mr Smith' is another example of an exploded composition, allowing the user to hear and feel how a piece has been developed from a very small initial idea. Issues such as, how the material was generated, textural considerations and instrumentation are discussed. Users are also able to hear parts separately and in combination with each other.

The authors are keen to receive feedback from teachers who make use of these materials in the classroom and an electronic evaluation form is available on the web site for this purpose. To date, only a handful of replies have been received although hundreds of users appear to download these lessons each month.

National Grid for Learning (NGfL)

The UK Government's targets to have all teachers fully conversant with the use of Information and Communication Technology in their teaching by the year 2003 are clearly laid out in the Government's National Grid for Learning Challenge of 1998 (DfEE, 1998).

The Scottish Virtual Teachers' Centre is a web based resource for teachers created as part of the National Grid for Learning. The music resources currently available demonstrate one or two ways of delivering high quality materials over the World Wide Web for use in the classroom. Each of the pieces contains notes on the concepts used and descriptions of the devices and techniques used by the composers. Parts and scores can be downloaded in portable document

format (pdf) and can be printed by the user. Sound files in a variety of formats are also available and teachers could make imaginative use of MIDI files to provide backing tracks for classroom activities. MIDI files can be downloaded by the teacher and played back using the MIDI instruments built into the computer or they could be opened in a MIDI sequencing program, allowing the teacher to edit the music for accompanying a group performance, using techniques such as muting, solo, cycle, tempo changes and volume changes. This would also allow for further exploration by pupils themselves of the concepts used in the piece.

Further developments could include banks of material for non-specialist primary school teachers that can be downloaded to schools. Sound files of songs, at both practise and performance speeds could be provided together with versions of songs with and without voice. Another interesting idea would be to provide a 'rote' version of each song so that teachers and children could learn one line of the song at a time. Teachers could also download a recording of a piece or song to a computer and either to play it from there or make a simple transfer to audio cassette for playback away from the computer. Transfer of files to more permanent media such as Mini Disc and Compact Disc would allow for greater flexibility and easier access to specific points in the music. Of course, these materials would need to be copyright free and therefore, initially, quite expensive but such an investment would enable schools to create archives of regularly used materials and allow individual teachers to produce class or stage specific banks of useful musical resources that can be easily retrieved and used in the classroom.

New Opportunities

Along with the promise of an e-mail address for every child in Scottish education, the Government has also committed itself to the provision of training in I&CT for all new and existing teachers by the year 2003. The Scottish Executive Education Department has accredited various consortia that will offer training for all Primary and Secondary school teachers. The funding for this venture comes from the aptly named New Opportunities Fund. Given the previous developments in the use of technology in Music teaching outlined in this paper, it is indeed a new opportunity for clear thinking and farsighted educators to share their vision with practitioners in music classrooms throughout Scotland.

The experience of the authors in these important developments in Scottish music education is that Scottish music educators are not fully utilising the learning potential of new technologies. The training providers accredited by the Scottish Executive must ensure that teachers gain more than procedural knowledge of software packages and bits of hardware. How teachers use the tools to improve the learning experience for all students is a key priority of the Government led New Opportunities Fund Information and Communication Technology project.

Teachers in training

As well as teachers in service gaining confidence in the use of technology for teaching and learning in music there is a responsibility on teacher educators to provide opportunities for teachers in training to develop competences in the use of Information and Communication Technology. At undergraduate level, courses in music education at our own institutions place emphasis on the acquisition of skills in the use of sequencing software and in recording technology. Courses in digital audio, digital signal processing and electro-acoustic composition are also offered. In Scotland, all entrants to postgraduate training in teacher education must demonstrate and provide evidence of the use of I&CT in their first degree. There is still a surprising disparity in the depth and breadth of knowledge of students which, in turn, suggests a wide variation in the quality of experience of music technology provided by different institutions. Postgraduate courses in teacher education must now provide students with opportunities to develop a range of skills and abilities in the use of I&CT in the preparation and implementation of lessons. In music, many students are moving beyond the straightforward use of word processors and sequencing packages and are beginning to integrate text and graphical information, MIDI files and sound files in Mini Disc and Compact Disc formats.

Familiarity with web based discussion groups, e-mail and other conferencing tools is rapidly becoming the norm and it is important that these new teachers will continue to utilise resources such as the Spider's Web Composing Lessons and the materials available at the SVTC. However, what is equally important is that new teachers consider the different learning and teaching approaches and methodologies demonstrated by these resources and that their interest and enthusiasm for these will in turn convince more experienced teachers of the benefits that technology can bring to the music curriculum.

In summary, the use of music technology will flourish if teachers and teacher educators:

- fully utilise the potential of music software in the classroom;
- make software and hardware accessible to students in the classroom;
- consider ways in which music technology can help develop musical skills such as musical memory, audiation and responding to musical stimuli;
- use music technology to provide 'scaffolding' opportunities for learners;
- avoid the acquisition of 'inert' knowledge (Scardamalia & Bereiter, 1985);
- "keep the learners' brains running in high gear" (Brooks, 1997, p. 12);
- consider ways that core skills such as critical thinking and planning and organising can be developed through music;

- consider the use of more processed based approaches to the acquisition of skills in composing and;
- share expertise with colleagues.

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