Music and ejay: an opportunity for creative collaborations in the classroom

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Abstract

This paper draws on results of a research project InterActive Education: Teaching and Learning in the Information Age (see www.interactiveeducation.ac.uk). The overall aim of the project was to examine ways in which new technologies can be used in educational settings to enhance learning. Research was carried out across a range of school subjects: English, history, geography, mathematics, modern foreign languages, music and science. Within this paper we report on the work of two teachers within the same primary school who devised an initiative to support the development of composition skills of children aged 10 and 11, using Dance eJay software. We explore the ways in which collaborations took place between the pupils, arguing that eJay provides a rich mediational tool where creative outcomes are negotiated. We suggest that the computer workstation provides the mediational means by which all pupils – whether or not they possess formal instrumental skills – can be creative, working within a musical style in which they are culturally located. Furthermore, we propose that the teacher is central to the creative - collaborative process and suggest implications for teachers when planning for creative, collaborative work in the classroom using music software such as eJay.

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Key Words

Composition, ICT, music computer software, creativity, collaboration, mediational tool, mediational means.

Introduction

Computers for music are now becoming common in classrooms and are used for the development of a variety of skills – composing, performing, listening and appraising - and are also used as important sources of information. Many issues surround their use and there is still considered to be a need for further research (Airy & Parr, 2001; Nilsson & Folkestad, 2005) and a reconsideration of their use within the context of the classroom (Savage, 2002; Cain, 2005). The adoption of software for music has historically been a mixture of embracing tools aimed at the music classroom and tools primarily designed for other applications, such as professional studio environments, the production of professional scores and entertainment. A key question for educators has been how suitable for music education is software aimed at other contexts? The sample sequencer eJay is one such tool, originally aimed at the entertainment market but now considered a legitimate tool for the teaching of music (Dillon, 2003; Crow, 2006).

The developments of microprocessors in the early 1980s spearheaded the use of music technology equipment in schools. Early adoption took the form of synthesizers, but it was the advent of MIDI (Musical Instrument Digital Interface) in 1983 that provided the connectivity to make all manner of music devices work together – including computers. At this time, in the world of contemporary popular music, musicians were vigorously exploring the creative possibilities of the new technologies but computers were slow to appear in school music departments and even today:

> It is rare for a department to be equipped to a level that allows whole-class use of music technology equipment at Key Stage 3.[2] (Ofsted, 2004, p.4)

In the 1970s, the work of the UK Schools Council project 'Music in the Secondary School Curriculum' was seminal in influencing the inclusion of composing as a mandatory part of the Music National Curriculum (Paynter, 1970). Since this time, creative composing in the music classroom has largely taken the form of group work, with students following a given brief and working typically in groups of four or five towards the creation of a piece of music,. The lack of sufficient computer workstations to enable a full class (typically thirty children) to work at the same time, led many teachers to shy away from including computers as part of group composing activities for children in upper primary or lower secondary school (aged 9–14); their introduction most often came about when students began solo composition work towards formal examinations (at the age of 14, or thereafter). Moreover, early music software for the classroom was based on that used by professionals and was seen to be too complex for younger children. These two factors were largely responsible for teachers being reticent to provide opportunities for collaborative creative work using computers at key stage 2 (ages 7 –11) and key stage 3 and these factors still impact on the music classroom today, despite the production of software especially designed for use by younger children:

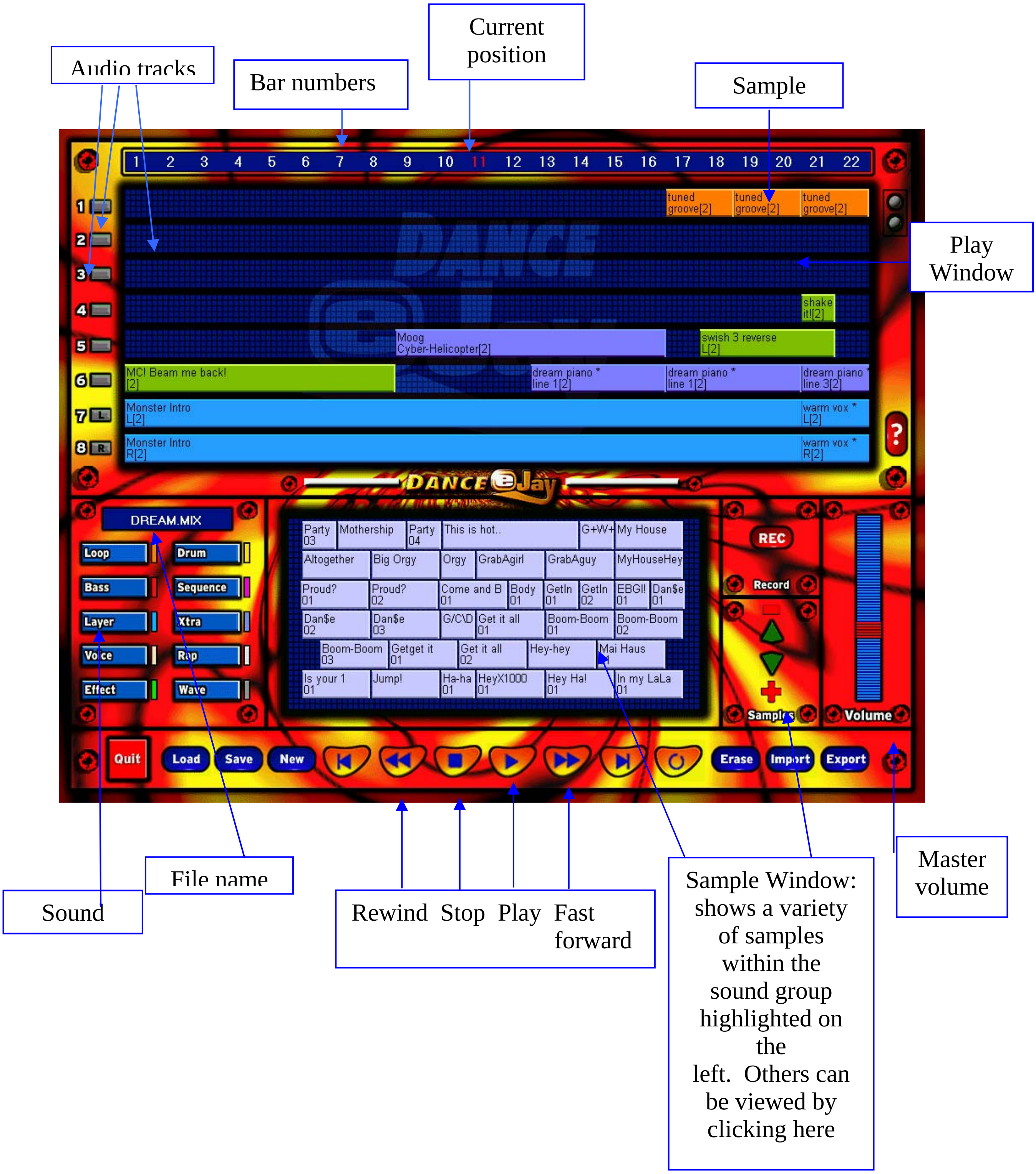
> Teachers are far more successful with music technologies in Key Stage 4 (14–16 year olds) and on post-16 courses than with younger pupils, and there is a need to extend good practice into Key Stage 3. (Ofsted, 2004/5)

Within this paper we consider collaboration and creativity through a study of the work of two teachers, within the same English primary school,

[2] Children aged 11-14.

who devised an initiative to support the development of composition skills in children aged 10 to 11, using Dance eJay music software. This software provides the user with a variety of short musical samples which they can organise to create their own piece of music. Each sample is represented as a coloured box with its name on it; these boxes vary in length, according to the length of the sample itself. Samples of a similar quality have the same colour and are placed together as sound groups. Sounds are selected and dragged onto the ‘Play Window’ which consists of a number of audio tracks that can be filled or left empty, depending on the number of samples that the user wishes to place together. The ‘Play Window’ can be saved as a file for future recall.

Fig. 1:'Opening of Dream Mix': Pre-recorded Demonstration Track (provided with the software)



Prior to the project, the choice of the software was discussed by the teachers. Echoing the thoughts of other music educationalists (Cain, 2004), there was a question mark over just how creative compositions with eJay could be, owing to the perceived limitations of the software in which pre-recorded musical elements are provided for the pupils. In this paper we present data which we believe highlights the creative possibilities of such software within the music classroom.

We begin with a review of the theories of creativity in the classroom, drawing out links with socio-cultural perspectives on learning, and follow with a consideration of previous research on collaboration within creative classroom music activities. We then present our methods of working including a short description of the unit of work created by the two primary school music teachers in collaboration with the two university researchers. Drawing on the data of the InterActive Education Project[3], we continue with a discussion about the collaborative and creative processes that we observed within two classrooms, highlighting the roles of the pupils, the computer and the teachers. Finally, we present our findings in the light of our espoused socio-cultural perspectives.

Theoretical framework

a Socio-cultural theory

Socio-cultural theory underpinned the work of the InterActive project as described by Sutherland et al. in *Transforming Teaching and Learning: embedding ICT into everyday classroom practices* (Sutherland, Armstrong, Barnes, Brawn, Breeze, Gall, Matthewman, Olivero, Taylor, Triggs, Wishart & John, 2004a, pp.414–415). An aspect of this, that tools are the mediators of human action, was central to our understanding and this was interpreted in a

[3] The aims of this ESRC funded research project (see www.interactiveeducation.ac.uk) were to understand more about the relationship between ICT and learning and to find ways of using ICT in education to make teaching and learning more effective. Work in music, English, geography, history, mathematics, modern foreign languages and science was carried out with 56 teachers from 10 institutions: 4 primary schools, 5 secondary schools and 1 tertiary college. The research design included five strands each of which looked at ICT in relation to a specific aspect: (i) teaching and learning (Sutherland *et al.*, 2004a), (ii) policy and management (see Dale, Robertson & Shortis, 2004), (iii) subject cultures, (iv) professional development (see Triggs & John, 2004), and (v) learners' out-of-school uses of technology (see Kent & Facer, 2004).

musical context to include objects such as keyboards, instruments, worksheets and computers; semiotic systems, such as language, music notations and computer interfaces; social interaction, such as the communicational modes used in group work, and institutional structures, such as the school music policy.

An important aspect of socio-cultural theory relates to the experience, knowledge and skills that the students bring to the classroom from their out-of-school experiences. This is particularly relevant to music and youth culture, which permeates the lives of children. (Tarrant, North and Hargreaves, 2002). We consider that tools reflect the cultural settings in which they were created and intended for and are themselves continually re-designed as they are used and as the cultures that created them also change. Cubase[4], for instance, was developed primarily for use within a professional music context and its interface contains many echoes of the studio environment. Furthermore, its continually evolving design has reflected changing professional studio music culture. Socio-cultural theory emphasises the belief that students, jointly, actively construct knowledge drawing on what they already know, believe and feel (Vygotsky, 1978). As Vygotsky (1997) notes, a student:

> … represents the totality of social relations internalised and made into functions of the individual and forms of his (*sic*) structure.

We have found it useful to consider the ‘agent acting with mediational means’ (Wertsch, 1991, 1998) as a useful way of illuminating the actions of pupils, particularly the negotiation of the composing process that the use of the computer tool by pairs of pupils not only offers the potential for, but also shapes.

[4] Cubase is an example of a MIDI and audio sequencing package of the type commonly used in schools.

b Creativity

Vygotsky's work is seminal to any discussion of creativity, as Moran and John-Steiner note:

> … he viewed the creative process as interaction, tension, transformation, and synthesis over the parallel time scales of the creative act, the creative life, and historical cultural development. (2003, p.62)

Another key aspect is Vygotsky's notion of Western creativity as 'externalisation' which he described as the development and drawing together of the emotional response and cognitive symbol, the symbol having the potential to create meaning in the culture within which it is articulated. (Vygotsky, 1978)

At this point we consider that it is important to examine the issues surrounding professional composing in order to provide a context for a consideration of creative composition in the music classroom. Amabile (1983) suggests the combination of three necessary attributes for creativity: intrinsic motivation, knowledge and abilities relevant to the domain and creative-relevant skills. He considers the latter to comprise three core competences: a flexible approach to problem solving, the ability to generate novel ideas and the stamina to work in a concentrated manner for long periods. This has many resonances with the work of Csikszentmihalyi (1996, pp.27–29) who proposed a 'systems model', an interrelated system consisting of three main parts: the 'domain', ('… a set of symbolic rules and procedures'), the 'field', ('… the individuals who act as gatekeepers to the domain') and the 'individual person'. A person must learn an existing domain's rules and can only then be creative and produce 'novel contributions' within this domain with the consent, recognition and legitimisation of the field. Interestingly, Csikszentmihalyi questions whether it is possible for children to be creative however talented they may be, since they will inevitably not know all the rules of a domain. He notes that adult creativity when displayed by skilled professionals appears to display a higher level of purpose, in that it aims to produce:

> … changes [to] an existing domain or that transforms an existing domain into a new one. (*ibid.*, p.28)

Similarly, Keith Sawyer (2003, p.240) proposes a delineation between "creativity" (everyday "cleverness" as exhibited by children) and "Creativity", ("the creation of culture-transforming products", only possible by adults). So what is creativity in the music classroom? The National Advisory Committee on Creative and Cultural Education (NACCCE, 1999, pp.6-7) suggests that:

> All people have creative abilities and we all have them differently. When individuals find their creative strengths, it can have an enormous impact on self-esteem and on overall achievement.

This is exemplified in the music classroom as creativity as a personal attribute. NACCE (1999, p.29) also delineates four characteristics of creativity:

- thinking or behaving imaginatively;
- activity is directed towards achieving an objective;
- something original (new to the pupil) must be generated;
- following pupils' critical evaluation, the outcome must be of value in relation to the set objective.

…which they maintain naturally apply to all arts subjects. (*ibid.*, 1999, p.13)

Creativity is now considered central to the Music National Curriculum in England (QCA, 2007). Such is the importance placed upon developing this aspect, that pupils are required to:

> Develop creative and compositional skills, including song-writing, arranging and improvising. (*ibid.*, 2007)

c Collaboration

Exploration of children's collaborations within music composition activities in 'traditional' music settings has been carried out by a number of researchers (MacDonald & Miell, 2000; Miell & Littleton, 2004; Miell & MacDonald, 2000; Morgan, Hargreaves & Joiner, 1997). Wiggins' research (2000) looked at shared understandings as observed in students' musical interactions and suggested that students' work is particularly successful when these thoughts are shared. Kaschub (1999) reported on student descriptions of compositional processes which revealed that they adopt different approaches dependent upon whether they are working individually or collaboratively.

Research into the use of computers for music composition has focussed upon the creative possibilities or the creative processes of computer-based composition (Nilsson & Folkestad, 2005; Savage, 2005; Seddon & O'Neill, 2003). Few researchers have explored *collaboration* in relation to composing with ICT; some researchers have focussed their work exclusively on children's dialogue (Hadjileontiadou, Nikolaidou, Hadjileontiadis & Balafoutas, 2004; Dillon, 2003, 2006) whereas, in our study, we consider discourse as involving a wider range of communicational modes. Savage and Challis have considered the use of more than one mode in their research on the effects of composing using computers, and the collaborative processes observed, within a creative project using digital technologies that involved school students and young offenders (2002). Of necessity they focus on ways in which the technology enabled the young people to work together despite being situated in geographically separate spaces; although the two groups of students did not work face-to-face, collaboration was possible *because of* the use of music technology. Their research differs crucially from our study in that their project included work outside the traditional classroom and involved two artists, an electro-acoustic composer and a film-maker, whereas we were particularly interested to investigate composition work in 'natural' classroom settings where the classroom teacher taught the class alone.

In this paper, we argue that the inclusion of the computer into the music composition process within classroom group work adds many new dimensions to participants' collaboration. Central to our frame of reference are the previously discussed socio-cultural aspects of student learning. We seek to consider a broad view of the classroom, reflecting not only on student-to-student interactions, but also on the ways in which the teachers orchestrate the learning experiences. Furthermore, we consider the effect of the computer as a mediational tool in the student learning process and the ways in which it acts as a shared space for the negotiation of meanings within the composing activities.

Methodology

This research formed part of the InterActive Education project that examined the ways in which new technologies can be used in educational settings to enhance teaching and learning. The project used an interactive research methodology that is linked to practice outcomes (see Sutherland, Robertson & John, 2004b). This is exemplified in the nature of the 'teaching interventions', the form of data collection and the results of the negotiated partnership between the university researchers and the school-based teacher-researchers. The project centred around the design and evaluation of longitudinal teaching and learning initiatives known as 'Subject Design Initiatives' (SDIs). These short units of work were designed by individual or pairs of teachers (from a single school) within each subject area.

The music team[5] chose to explore ways in which students approach the composition process through the use of various software programs. The teachers each devised an SDI typically spanning a half term. Its design was informed by theory, research-based evidence, teacher's craft knowledge and feedback from members of the subject design team. A key aspect of this work was an iterative process that consisted of initial exploration; pilot design; the pilot itself; reflection using the video data by teachers and researchers; modification of the SDI followed by the production and teaching of the final

[5] The music subject team comprised three teachers from two primary schools, five teachers from three secondary schools and two teacher educators/researchers (Gall and Breeze). The team worked together over a period of two years both together and in teacher/researcher pairs.

design, to the same year group, a year later. The longitudinal study typically spanned two to three academic years. In each teacher's classroom the typical practice during 'traditional' composition activities of students working in groups of about four or five was replaced by paired work, with each pair working toward a joint outcome at one music computer workstation. In the school described in this study, the pupils worked in the computer suite, whereas in all the other schools they used computers within the music classroom.

The Subject Design Initiative 'Composing in Ternary Form with Dance eJay' was developed collaboratively by two primary teachers from the same school, with support by the two university teacher educators/researchers (Gall & Breeze). Students aged 10 and 11 were asked to work in pairs to compose a piece of music with the structure - Introduction, A, B, A and coda (ending). The 16 bar introduction had to include one continuous sample ('*Myth*') throughout and had to build to a small climax in preparation for section A. Section A had to have an 'ambient' or 'relaxed' feel. As is required in ternary form, section B had to be a contrast to A and section A had to be repeated after B. The pupils were able to add their own vocal parts to either section A or B.

The pupils worked within the computer suite over a series of six weeks using Dance eJay, software which allows the user to organise pre-recorded musical samples – all of which fit together harmonically and rhythmically – using the computer keyboard and mouse. Students were also asked to add their own vocal melodies/sounds to their piece. The two staff developed the SDI together but taught different classes within the same year group. This was the first time that the teachers had engaged their students in composing using technology, although a few individuals within each class – who had instrumental tuition – had had some experience of creating compositions with keyboards.

Data was collected in the form of digital video of classroom interactions, students' composition products, digital screen grabs taken every 15 seconds, and discretely named multiple-saves of the sequencer files to capture the process of the work, described by Folkestad, Hargreaves and Lindestrom as the 'portfolio' method (1998, p.85). We also carried out interviews with both learners and teachers before and after each SDI. In each of the classrooms, six students, chosen by the class teacher, were the focus of the research: two 'low-attaining', two 'average' and two 'high-attaining' with a balance of ethnicity and gender. Of the pairs, some were mixed gender and others the same. The teachers chose the pairings, ensuring that the students did not work with their closest friends. During the teaching of the second, modified design, a video diary made at the end of each teaching session recorded the six students' immediate thoughts on the lesson.

The process was complex and, like the development of the SDIs, was iterative in that we fully developed our method of collecting sound and pictures over the period of the first year, modifying and re-modifying approaches. There were two main difficulties. The first was to be able to capture the process as shown on the computer screen, whilst also capturing the ways in which the student(s) used the musical keyboard – and to ensure that these were synchronised. The second was to capture the sound from the computer as well as the sound of the students talking.

Our final method involved using two cameras for each pair of students; one focused on the screen the other on the music/computer keyboard. A wide-angled shot was taken with another camera, which captured the whole-class activity, such as teacher introductions and plenaries. A mixer was used to capture the sound from the students' individual microphones as well as the sound from the computer or keyboard, since the sound from the computer could not always be heard as students often wore headphones. Video footage was viewed alongside the musical products that were saved as computer files.

Collaboration

a The Adoption of Computers for Music Composing

How does the introduction of a new tool – the computer – for composing activities affect the ways in which pairs and groups compose? In this study, it was observed that when talking with their partner or other classmates about their work, pupils often used the computer's visual representation as a starting point for a discussion, for example, about the structure of their piece. The following transcript comes from the very beginning of a lesson after the teacher has asked pupils to check that their section A is 'ambient' before moving on to composing section B (the pupils having already composed the introduction).

Fig. 2: The interface being discussed by boy 1 and girl 1

Boy 1 and Girl 1 look at the screen throughout this dialogue:

Girl 1 We need theme A.

Boy 1My word!

Girl 1What? Shall we listen to it first?

Boy 1Are you sure we're doing that bit?

Girl 1See it's got the bottom bit, remember?

(They listen, and move to the music)

Boy 1I love that bit!

(They continue listening to the music)

Girl 1This is where um…our theme A starts.

Boy 1That's our introduction, isn't it?

Girl 1Yeah and that's where it [theme A] starts. (pointing to the screen)

Here, when Girl 1 reminds Boy 1 of the 'bottom bit' she is referring to the underlying sample that they were asked to include as the starting point for their introduction ('*Myth*'): it is the visual representation that serves to help her explain to Boy 1 the section that they have arrived at.

The coloured blocks on the eJay screen were also particularly helpful when discussing the texture and structure of the music: pupils could refer to the blocks of colour if they did not have access to the correct musical language. During interviews, pupils commented on the fact that their discussions about their computer compositions continued in the playground during break times, where they used the names of the samples to discuss the music. Interestingly, whilst at the computer, the remarks made by the pupils were often directed at the computer screen, not at their partner, as they viewed the visual representation of the music playing. A common feature of the working of all pairs was that the pupils played the music repeatedly and articulated their ideas whilst it was playing. However, conversation was not a constant feature of the composition process; pupils often communicated through gesture (i.e. by moving in time to the music and pointing at the screen) or by gaze (i.e. turning to face their partner, indicating their thoughts through facial expressions such as a grin or grimace).

b Control within the Collaborative Process

An issue that arose for the teachers in relation to group composition at the computer concerned the role of each pupil. In discussion at the end of the project, the teachers felt that they should have planned into the activities opportunities for both individuals to be responsible for the mouse – significant in the eJay mouse-driven environment – in equal measures and at distinct times. Their reasoning was that this role brought with it a greater degree of control over the composition process. The pupils were divided on this issue: one student expressed her preference for not using the mouse as it freed her to think more the music:

> When you're not using the mouse, you can think about the music … without putting up the [musical] sample.

Another student agreed that one did not actually need to have control of the mouse. She explained that her partner had asked to use the mouse all the time because he did not want to 'use the [computer] keyboard' and she had agreed to this; however, she was clear that she maintained control over the process (and the video data provides evidence for this):

> Boy 2 used the mouse because he hated typing … I just gave him instructions; he had to follow them.

However, she explained that this only applied to part of the composition, as she and her partner had decided at the start of their work together that each would be 'responsible' for different sections of the music, meaning that one person would have the final say over 'their' particular section. Despite this division of decision-making, both said they were happy with the final outcome. For another pair of girls it was observed that collaborative skills took precedence over the 'power' of the mouse: after almost every change or addition to the composition, both were concerned to ask if the other was happy, thus it did not matter who used the mouse.

A number of students did take control away from their partner by seizing the mouse: there were numerous occasions where pupils grabbed it from their partner who was using it, sometimes to force their control and at other times to show the meaning of their verbal statement when their partner did not appear to understand what had been said. The majority of pairs were at pains to swap roles throughout the series of lessons, even though the teacher had not given this direction. It appeared that the pupils viewed the two roles - with and without the mouse - as being distinct, had already developed an awareness of ‘fairness’ and were concerned to rotate roles equitably.

c Other Issues Affecting Collaboration

Some pupils suggested that personal qualities affected their collaboration. One girl felt that working with a partner who had differing musical preferences to her own added to their collaboration because according to her, he tended towards selecting samples that related to his preference for ‘classical’ music whereas she selected ‘hip-hop’ sounding samples. Some felt that the collaboration was affected by the gender of their partner. A number of males suggested that there might be more arguments if pairs were mixed gender and both boys and girls explained that the gender of the pupil affected their selection of samples; either the sound or the name apparently appealed more to one than the other. Other pupils welcomed mixed gender pairing:

> … it’s better if you’ve got the girl’s viewpoint and the boy’s viewpoint and then blend them together.

Neither in the video-diaries or interviews did any pupil express concern about collaborating with a member of the opposite sex or someone that was not a close friend. Additionally, their comfort in working in pairs was clear from the video data.

d Teacher Framing of Composition Work

Previous discussion has focussed on interactions between the pupils and the computer. However, it was clear from the video data that the role of the teacher was key in establishing the positive learning environments that made effective collaboration possible. While constraining activities to scaffold learning (Davis, Sumara and Luce-Kapler, 2000. p.87), the teachers were concerned to provide a risk-free environment for the pupils to experiment with the novel tools. Notions of sharing and discussion permeated the whole lesson design. The structure of each lesson was similar, building in numerous opportunities for the formal 'sharing' of ideas and work in progress: 'launch' including modelling/review and appraisal of previous work, 'practical' time for paired composition and final 'plenary' with review, appraisal and a looking forward to the next lesson. Additionally, the overall composing process was broken down by the teachers into manageable 'chunks' (one week, the introduction; the next, section A etc.) so that in every lesson, the focus of the collaboration was clear. The sharing and discussion was at whole-class level for the launch and ending plenary sessions, whereas during paired composition time students were actively encouraged to discuss work not only with their partner but also with other pairs sitting adjacent. In fact, movement around the classroom was very much supported by the teacher as a means of increasing student collaboration.

At the start of the project, although the teachers envisaged the pupils would respond well to the computer-based work, being non-music specialists and new to the use of ICT for music, their initial perception was that its use for composition would necessitate the adoption of new pedagogies requiring new lesson designs and learning approaches. Certainly, the teachers recognised the need for the pupils to learn new technical as well as compositional skills, which necessitated the production of work-sheets and the inclusion of support for developing technological skills. However, following familiarisation with the software, they naturally moved towards embedding computer-based composition within their existing pedagogical frameworks. Higgins (2003) notes that teachers may need to teach pupils how to interact with each other when using the computer collaboratively so that effective learning can take place, but in these classrooms it appeared that the students had already developed these skills elsewhere in the curriculum, which allowed them to make the most of the collaborative opportunities available within this project. Without explicitly claiming to have done so, the teachers had orchestrated a learning environment where learners were supported by 'the gift of confidence', a term coined by Jean-Paul Sartre and discussed by Mahn & John-Steiner (2002, p.48). The 'dynamic interplay between their interactions' (*ibid.,* 2002) was evident in the video data. Furthermore, within interviews and the video diaries, students commented on the 'reciprocal emotional support' (*ibid.,* 2002) provided by their partners and the rest of the class.

Creativity

a The Motivating Affordances of the Computer Software

Within the interviews and video diaries the pupils expressed their excitement at the use of the eJay software within music composition lessons; the researchers who collected the video data and the class teachers were astounded at the focussed work of all pupils for virtually 100% of the time on the project and other teachers commented on the 'buzz' within the school as pupils discussed the work outside of lesson time. The teachers and researchers were very clear that the high level of motivation – which was at the heart of the positive student collaborations – came about largely because of the affordances[6] of the software.

During interview, a number of pupils with less experience of 'traditional' music-making explained that, when working in groups of four or five, in

[6] See Gall & Breeze (2005) for discussion of the multimodal affordances of differing types of music software packages.

‘traditional’ composition activities, the ‘instrumentalists’ were often given access to available instruments and often took control of the composition process; as a result, these ‘less experienced’ pupils felt disinclined to participate in the activity and that they had less ownership of the final product. Working in pairs using eJay, these students felt that they had more control over the creative process than in larger group ‘traditional’ settings, but recognised that their increased confidence and ability to carry out tasks was related to the ease of using the software. The teachers explained that this particular software helped provide a supportive environment in which every student could explore musical possibilities freely, whether or not they had formal musical skills. The music co-ordinator’s description of all pupils starting on ‘a level playing field’ reflects other educators’ suggestions of the ‘democratisation’ of music afforded by the use of new music technologies (Airy and Parr, 2001; Durant, 1990; Goddard, 1999; Savage and Challis, 2002).

Another motivating affordance of the eJay software was that it enabled pupils to compose in contemporary styles with which they identified and which permeate their worlds outside of school:

> You can make your own music.
>
> … like if you hear instruments playing on those classical tunes but, like, we’re into hip-hop and rock and stuff like that … so it’s quite … strange for us, to hear the music we’re into…it’s new…it’s good.
>
> It has a better beat!

Related to this was the excitement – particularly of a number of boys who expressed dislike for the largely singing and percussion-focussed ‘traditional’ composing activities – was the fact that the software gave them access to sounds that might not otherwise be available within a primary school, for example drums, electric guitars, and sounds modified by effects units.

Previous discussion has highlighted the many positive aspects of computer-based composition with eJay software but what of creativity? To what extent does the type of music computer software that is based around the use of pre-prepared musical samples support creativity? Our data suggests that possibilities for creative outcomes can be fashioned by the teacher through the way s/he plans the composition task; even though all the pupils were working to the same brief, they all produced distinctly different outcomes. This can be seen in these two very contrasting screenshots of the openings of pupils' compositions:

Fig. 3: Opening - example 1

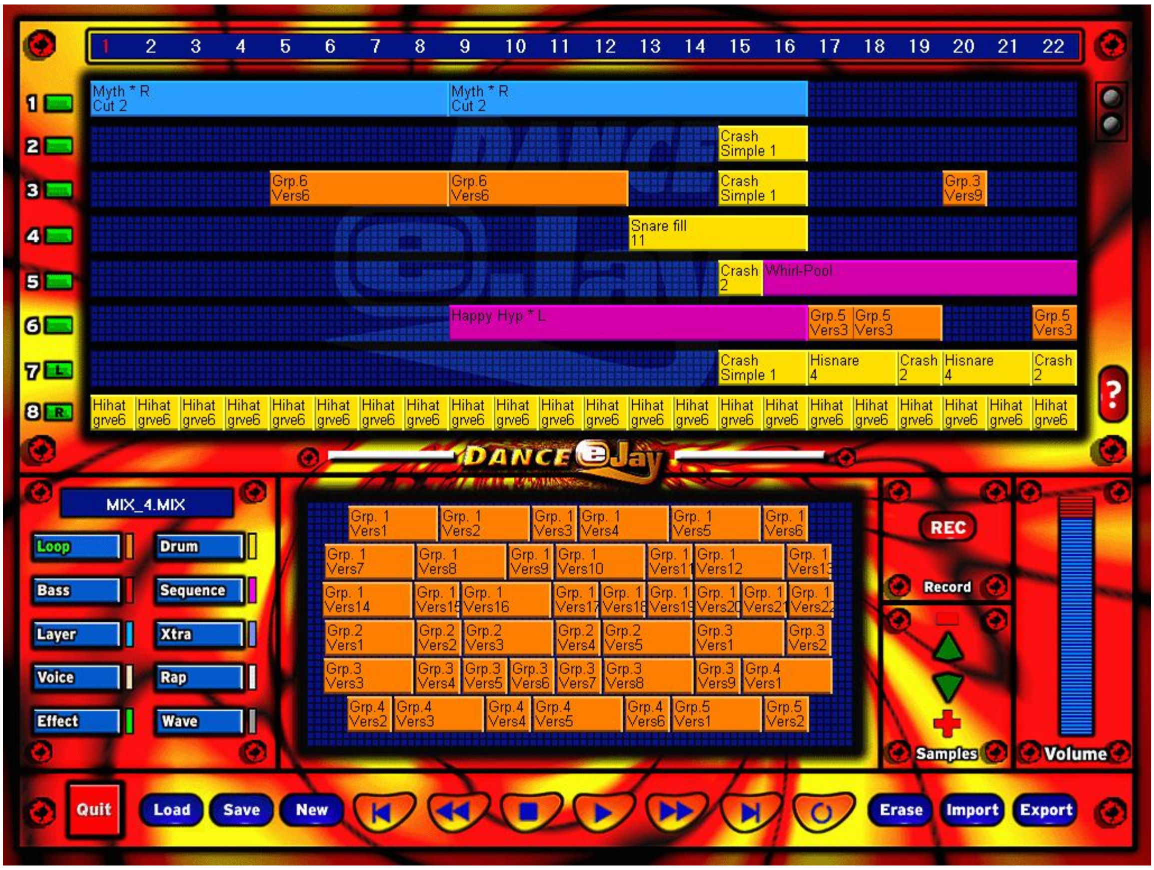
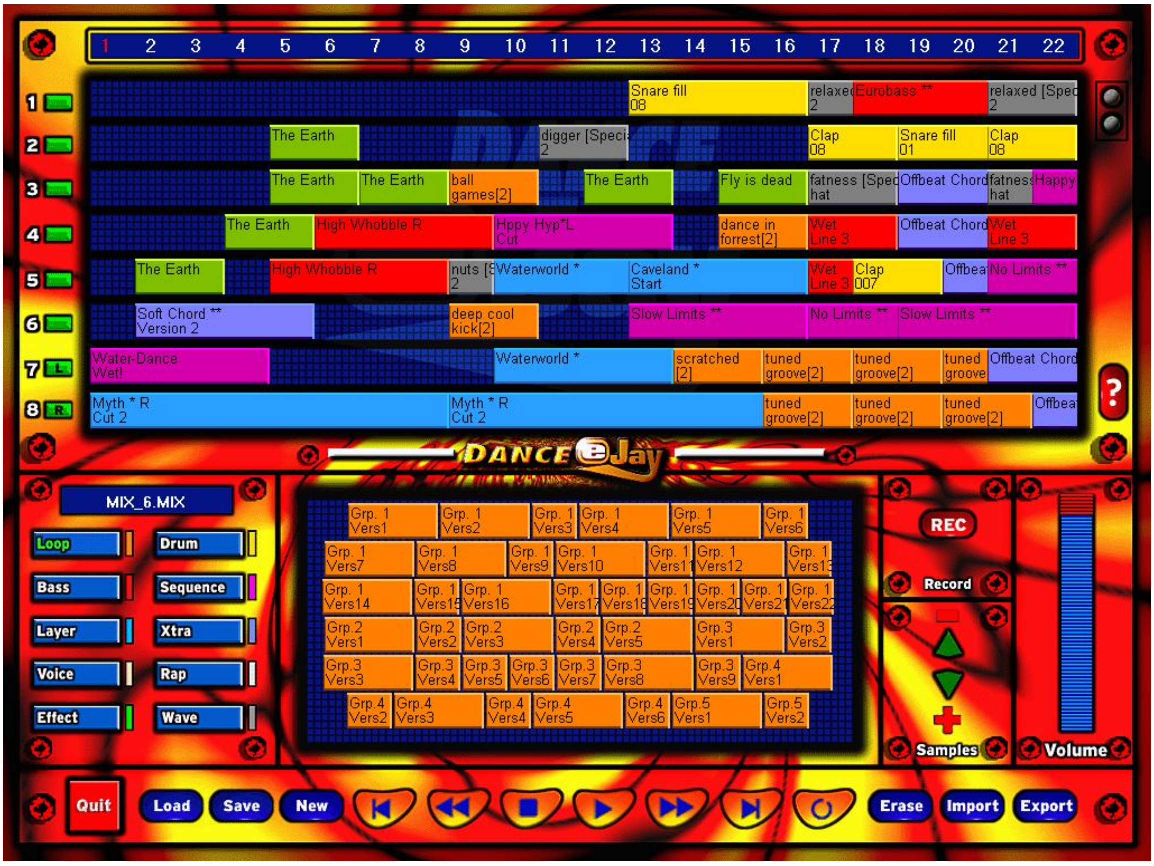


Fig. 4: Opening - example 2



Even though it might be considered that because each group were using the same samples their compositions might be similar, the two illustrations above indicate that they are actually quite unique. For example, all groups were asked to use the 'Myth' sample during the 16–bar introduction, which is a sustained series of string-like chords in an A minor, F, G, D minor sequence. Both of the two illustrations use this 8–bar sample twice but add to it very different combinations of samples.

In 'Mix_4' shown in fig. 3, it can be seen that the 'Myth' sample is accompanied initially by a rhythmic hi-hat rhythm, joined by a sample named 'Grp6' at bar 5, which consists of a bass drum note followed by tambourine off-beats. 'Happy Hype' is a monophonic arpeggiated quaver / syncopated semiquaver figure starting on the A below middle C, the 'crash' and 'Snare fill' samples combine to provide a crescendo into bar 16, where a rhythmic, syncopated, unison A synth. sample named 'Whirl-Pool' has already started.

In contrast, ‘Mix-6’ shown in fig. 4 is constructed in the manner of a sound collage, with ‘Water-Dance’ providing an initial monophonic syncopated synth. figure, followed by ‘Soft Chord’, a somewhat distant, muted, echoey melodic fragment and ‘The Earth’, a sound reminiscent of a rain stick. The ‘High Whobble’ sample provides another rhythmic synth. backdrop, to which is added the ‘ball games’, ‘nuts’ and ‘deep cool kick’ samples at bar 9 which combine to provide a lead-in to the ‘Happy Hype’ and ‘Waterworld’ (swiftly upwardly rising arpeggiated high-pitched sounds) samples at bar 10. At bar 11, the deep bass sample ‘digger’ is added, which adds depth and leads to the final crescendo started in bar 13 by the ‘Snare fill’ and ‘Slow Limits’ (a rhythmic organ chordal figure) sample and bar 14 by the ‘scratched’ sample and joined in bar 14 by ‘Fly is dead’ (a mid-pitched scratched sample) and ‘dance in the forrest’ (*sic*) (a 2–bar dance rhythm) which combine to provide a lead-in to the driving rhythmic A section at bar 17. Joining the introduction and A section together is a sample named ‘tuned groove’ (a 2–bar dance rhythm with hi-hats, snare and a tuned bass drum).

The above example, we believe, supports our notion of creativity in the music classroom. However, how ‘creative’ can a piece of popular music largely constructed from samples can actually be (Crow, 2006, p.125). In line with our earlier discussion of socio-cultural theory, for a piece of popular music to have meaning within a context it must be socially and culturally located. To be completely original is not impossible, but might sound very strange within a culture that is unable to connect it to existing musical forms and practices: as Green (2002, p.53) puts it, there is a …

> … necessity for all music to conform to conventions enabling it to be recognized as music at all.

Indeed, many contemporary forms of dance music rely on samples taken from previously-made recordings. For pupils in this study, producing music that sounded like music they would listen to at home was evidently important, and yet, all those who were interviewed felt that their pieces of music reflected their own creativity.

In suggesting suitable extension work for the further use of eJay, teachers could consider including some of the more esoteric features of the software, such as the Groove Generator, which allows for the creation of pupils' own drum sequences; the Time Stretcher, which enables changes to be made to the tempo of individual samples and the FX Studio, which provides for the editing and processing of the provided and original samples. These tools would furnish pupils with further means for creative possibilities.

Conclusions and Implications for Teachers

It was clear from our data that eJay provides a rich mediational tool, which was observed to be significant in providing a shared space for meaning making through negotiation. The very nature of the eJay interface lends itself to collaborative work, the visual representation of the music providing an important focus for the creation of musical meaning and the construction of musical products. This is congruent with Vygotsky's observation concerning the symbol having the potential to create meaning in the culture in which it is articulated (Vygotsky, 1978).

Collaboration and negotiation were very much in evidence; working with others who had different judgements was seen by participants as clearly beneficial. Through a consideration of 'agent acting with mediational means' (Wertsch, 1991, 1995) we were able to see how the potentials offered by the software (for example, the culturally relevant signing embedded in the interface, such as the use of colour, time-line and transport controls) actually shaped the negotiation of the pupils: they used the visual representation as a shared space to inform their views on musical structure and texture, the software-specific terminology, used on screen, as a common 'technical' language to discuss their choices, and the music playback facility as a shared audio event to inform their decision-making.

All pupils were able to produce creative outcomes, whatever their previous experience, each pair composing distinctly different pieces of music. The pupils were not only creating work that was new to them and of value in relation to the set objectives (NACCCE, 1999), they were composing music that they said was of great value to them owing to its cultural relevance and musical style.

Pupils were concerned with issues of equity and the use of the computer, especially the division of roles related to the use of the mouse. This manifested itself in some pupils taking the mouse in order to effect a change of their choosing and in other cases by pupils realising that roles should be rotated so as to ensure equity. Wertsch’s notion of the ability of the emergence of new cultural tools to transform power and authority (Wertsch, 1998, p.65) is exemplified here where the ability to action musical changes to the composition lies with the person controlling the mouse. This action may be performed as a result of the direct will of this individual or the will of the other pupil in the group, mediated via the tool of language.

So far, we have considered two crucial elements in our discussion of collaborative composing using computers: the computer and the other pupil; it is our belief that there is a third significant element – the teacher. Our earlier discussion of the data has highlighted the importance of the teacher in constructing a learning environment that promotes collaboration and creativity. Teachers’ initial concerns that their pedagogies would need to be adapted when introducing computers into the music classroom proved unfounded; while there was an inevitable requirement to consider practical implications, such as pupil grouping, the teachers were able to use and build upon their existing pedagogies.

To end this paper we will outline what we consider to be the implications for teachers following our study. A key aspect is understanding students’ cultural preferences and being able match learning experiences to their interests. Only through this awareness can pupils' motivation be maintained, linking the music in school to their worlds outside:

> Current curriculum models towards creativity often appear unable to engage certain pupils in authentic musical experience. (Crow, 2006, p.122)

Being aware of current music software and having the ability to use it successfully for musical ends is imperative; understanding its use as a user not only enables teachers to support pupils with technical issues, but also helps them appreciate its potentials.

The creation of an appropriate learning environment to support creative endeavours is important in enabling all pupils to achieve. Our study revealed key aspects of this: appropriate task design, balancing constraint and freedom; structuring of the activity in terms of time and parts of the lesson, especially the balance of group and whole-class activities; room and furniture design to allow for collaboration, especially for necessary movement between computer workstations; the use of headphones so that all pupils can hear their work clearly; the encouragement of collaborative talk to allow for the negotiation of the composing process and, crucially, the encouragement of an environment where it is accepted that pupils can take creative risks.

Teachers should expect to be able to embed the use of computers for music composing into their existing pedagogies. Although the use of technology is observed to change aspects of the composing process, this study has demonstrated that music learning goals can remain the priority, technology being used to effectively support and enhance these goals without the need for major pedagogic re-design.

When planning for collaboration in creative work using computers, we consider that the organisation of learner roles is crucial in ensuring greater equity in access to the activity. The need for teachers to personally experience the use of the software, and to appreciate the roles that can be taken by learners when using it, should be followed by design for appropriate rotation of these identified roles in the learning activity, thus addressing issues of equity within the collaboration process.

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