Breaking Through The Cyber-Space Barrier: An Exploratory Study into the Atomised Learning Environments of A2 Music technology

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INTRODUCTION

The aim of this Action Research study is twofold. I attempt to explore, and address, teaching for learning issues with regard to the technological reliance on computer software and hardware in music technology. In order to facilitate this I have deployed on each volunteer PC the Microsoft Netmeeting collaborative software. The software has been used primarily as a vehicle for discussion. I also seek to critically evaluate the current composition mark scheme in GCE A2 music technology in a bid to understand both its overt and covert values. There is a wealth of information available with regard to the use of ICLT in the classroom, but very little that examines the impact and challenges of ICLT in the delivery of music technology.

Substantial amounts of research have been completed into the integration of ICLT in the education sector. Becta, a UK agency, supports education departments in their strategic ICLT developments. These strategies ultimately have a far reaching impact on the Sixth Form College Farnborough and the teaching and learning that takes place within the institution. Becta (2005) states that:

> *'Research demonstrates that ICLT contributes not only in making studying more enjoyable but also enhances learners' perceptions of achievement. Studies also report that learners take more responsibility for their learning, making more sustained efforts with difficult tasks, when using ICLT'.*

It could be argued that the mark scheme and specification contain a *'Technologically Deterministic'* (Williams, 1974*)* bias, unlike the symptomatic technological approach alternative music technology courses and mark schemes contain.

Technology in the learning environment can be used and manipulated and act as a form of social control. Students that rely heavily on computer based technology risk becoming 'Atomised' in terms of social culture, and become much more 'Individualised', where perhaps previously they may have taken part in discussion and the exchange of creative ideas. The learning environment is encouraged by national, and institutional, ICLT policy to move ever forward into cyberspace leaving behind all but the early adopters of technology. Teachers may begin to lose autonomy of the traditional learning environment.

In the *Dynamics of Modern Communication (1995)* Patrice Flichy argues that as technologies develop they further fragment the groups consuming them, creating a more individualistic mode of consumption.

This form of 'fragmentation' and 'individualisation' may work to further prevent collective responses to content, which in turn works to assist those in power whose interests are served by people not acting collectively.

Critical opinion has appeared concerning the use of computers in education. Learning environments are set to be proliferated by convergent technologies.

Journalist Todd Oppenheimer created a great deal of controversy with his *1997 Atlantic Monthly article "The Computer Delusion,".* The author argues that there is no good evidence that most uses of computers significantly improve teaching and learning.

In the Atlantic Monthly article Oppenheimer (1997) makes the following statement with regard to the use of computers in education:

> *'In fact, when youngsters are put into groups for the "collaborative" learning that computer defenders celebrate, realistically only one child sits at the keyboard at a time. (During my school visits children tended to get quite possessive about the*

mouse and the keyboard, resulting in frustration and noisy disputes more often than collaboration.) In combination these constraints lead to yet another of the childhood developmentalists' concerns —that computers encourage social isolation'.

By combining both the two areas of research I hope to be able to gain a deeper insight into many of the issues faced designing and delivering a subject that, at present, requires excessive investments in ICLT, whilst hopefully offering alternate solutions to generic problems.

There is a danger here that the research could be too subject specific and therefore non-transferable across subject areas. I therefore aim to extract relevant transferable issues, points for further consideration, and most importantly the views and experiences shared between student and teacher.

At the time of writing the Action Research Project Edexcel (the sole examining body for GCE music technology in the U.K) has proposed a new specification in music technology for first delivery in 2008.

THEORETICAL BACKGROUND

Some years ago I had been in a training session that generated a discussion on Repair Theory; a theory that seeks to explain and rationalise how individuals learn procedural skills. I decided to explore and implement a strategy based on the notion of Repair Theory.

The main thrust of the theory concentrates on how and why learners make mistakes. These mistakes are termed “mind bugs”. The theory suggests that when a procedure cannot be performed, a block or impasse occurs and the learner applies various strategies to overcome this. These strategies are called repairs. Although Repair theory had been developed from extensive study of children solving arithmetic problems, it can be applied to the study of music technology. These procedural errors are systematic errors and should not to be confused with "slips" (Norman, 1981) or random mistakes. These mistakes can occur regularly in a particular learner's work.

During the study of music technology, more specifically the study of sequencing using computer software, students carry out many procedures. These procedures can be linear or branching. An example here would be a procedure that requires the initial set-up of the application to perform certain audio tasks. The learner can be expected to run through a minimum of four complex procedures before the actual assessed task begins. Each of these procedures is reliant upon one another in order that the bespoke computer application environment is created. However, it is possible to operate the computer application whilst not following the correct procedures – the lack of formal procedure introduces a great deal of errors in configuration. The issue here is that the application temporarily masks the errors which therefore allow the learner to introduce “mind bugs” into a variety of procedures. It is during these branching procedures that an impasse often occurs. It is possible to reach a given destination in the procedure that seems correct to the learner but is in fact a culmination of “mind bugs” that inevitably lead to an impasse.

It can be seen that learners attempt different repairs and these repairs often manifest themselves as different bugs. These bugs often migrate from one procedure to another dependent on the success of initial and fundamental procedure – “So bug migration comes from varying the choice of repairs to a stable, underlying impasse." (VanLehn, 1990). It could be argued that impasses are actually beneficial to student learning. Impasse-driven learning (Newell 1990; VanLehn, Jones, & Chi 1992) suggests that student learning may be enhanced when responding to an impasse. I thought it useful to attempt to deploy the theory in the classroom.

The results seemed impressive in terms of isolating learners with repeating “mind bugs” and incorrectly repaired procedures. However, other teaching and learning issues became apparent as did the need for a strategy to deal with these issues.

Previously many of the students relied heavily upon either the subject teacher or classroom technician to set up their computer application environment successfully. This is fundamentally down to the nature of the software and the variety of configurations. The number of complex procedures involved meant that those learners who were susceptible to procedural mind bugs and bug migration, required the most assistance. The temptation here is to “patch” the problem by the teacher or technician completing the procedure in the correct manner. This however may lead to a scenario whereby the learner never has the opportunity to address the faulty repair mechanism, or at least attempt to do so. This can be seen as counter-productive in terms of teaching and learning.

Issues of time management also began to manifest. The more I corrected the procedure for the learner the more time inevitably I would waste in the future as the corrective task would have to be repeated on numerous occasions. By isolating the faulty repair, and therefore creating a stable underlying platform, learners are able to continue to work through both linear and branching procedures. This would allow more time for teaching and reduce technological issues created by learners who were blocked in proceeding to the actual set task. It became apparent that Repair Theory had its place when dealing with meta-actions in a procedural environment.

METHODS

In order that I substantiate issues arising from the technological bias in the mark scheme, and the impact on teaching for learning, I have asked for two student volunteers to provide feedback on their experiences throughout the year. This feedback has taken the form of short interviews with participating students. The feedback seeks to identify and inform on effective teaching for learning, and barriers to learning in music technology. To further highlight these issues I have asked the students to explore the use of a collaborative tool (Microsoft Netmeeting) during their lessons. Collaborative tools are often suggested to offer solutions in terms of teaching for learning in cyberspace. It is expected through the application of the software that useful feedback will emerge.

Students have undertake routine tasks needed to continue with their coursework assignment with the addition of Microsoft Netmeeting. Netmeeting has been used as an alternative mode of communication for the students. The resources available are PC, soundcard, headphones, keyboard, MS Netmeeting collaborative tool, and computer keyboard /mouse.

After reflecting on an individual lesson, a lesson which has a focus on the impact of teaching and learning in cyberspace, the students emailed me their comments with the addition of an informal discussion.

Written documentation and existing research will be used to assist my Action Research exploration.

FINDINGS

Teaching for Learning issues –

Student responses to the study

Wearing headphones and working at a PC presents a variety of challenges for both student and teacher. Music technology students spend most of their time in this environment. One of the major challenges I have found as a teacher of music technology is the development of teaching and learning methods / styles. The subject clearly does not lend itself well to a number of traditional models of teaching and learning styles. The main headings are the students, drawn from their feedback; the discussion that follows each heading is the author’s work.

'Although headphones minimise the overall loudness in the room of 15 students, the downfall in this is the sense of student isolation from peers and, more importantly, from the teacher. A 1½ hour lesson can easily turn into 1½ hours of total isolation by wearing a pair of headphones'

'The teacher must physically leave his desk to help the student and this dependence can be seen by all students. In such cases the student can lose enthusiasm for the work due to feeling isolated, not understanding, not being comfortable when asking for help and this can result in poor progress'

As an extension to the action research I decided to introduce Microsoft Netmeeting, a collaborative tool designed for online communication. By using this tool I hoped to converse with students in cyberspace and generate discussion with regard to online communications and computer based learning.

'The online messenger method of communication between teacher and student is very appealing. In the present climate, technology is increasingly becoming a dependence for the typical student'

'This method allows the student to ask for help in confidence in a very subtle way'

One of the constraints of using an online communication tool is the ability to explain in a clear and concise fashion, confirming any errors of interpretation and understanding. Often in these scenarios the language can be reduced to one or possibly two fragmented, often incomplete, sentences and therefore easily misunderstood.

'To give brief messages to students could work, but I can't see it working when trying to explain something'

What became evident in the early stages of the research was that the students preferred to work in cyberspace with some form of online communication but were critical of the issues surrounding the process of teaching for learning. The students became aware of the social limitations offered by working in an atomised environment.

'Communication is vital especially in arts subjects to allow creative minds to share ideas and progress to produce high quality diverse projects'

A large number of students found the configuration / setting-up and management of software a large hurdle to overcome. These tasks in essence required the student to possess procedural skills. I decided to further investigate why students found this problematic and how best to combat this problem in the classroom.

Evaluation of the current composition 6717 / 01 mark scheme

I think it important here to briefly contextualise the current mark scheme before detailing the findings.

The mark scheme is broken down into the three following sections:

- Composition techniques
- Use of Technology
- Score

Within these sections there are sixteen criterion referenced assessment categories. The marks are aggregated so one strong element may compensate for one weak element. Overall the student may pass the module even though they may be carrying a failed element.

The assessment of compositional, and scoring, techniques follow a traditional path; a path associated with pure music composition that does not seek to test the understanding of music

technology. Melody, harmony, rhythm, texture, timbre form / structure, style, and coherence are all assessed to produce a criterion referenced aggregate mark.

However, issues begin to arise when assessing the *"Use of Technology"* criterion referenced categories. This section is further sub-divided into three categories:

1. Manipulation of Sounds
2. Creative Use of Technology in the Composition Process,
3. Quality of the Recorded Submission

(Edexcel *et al*, 2005)

The mark scheme level descriptors for 'Manipulation of Sounds' are clearly founded on a technological based hierarchical structure; that is if candidates have access to a plethora of technology then they have a clear and distinct advantage over candidates with access to modest technology.

The criterion referenced assessment categories range from "Little effective use of sound manipulation" to "First Class use of technology to produce an imaginative range of sounds and timbres through either recording and / or synthesis and other processes (FX, dynamic processing etc.)".

Level descriptors for "Creative use of Technology in the compositional process" range from "little effective use of music technology skills resulting in an incoherent and unconvincing composition" to "Highly proficient use of a wide range of music technology skills to develop an imaginative and coherent composition".

DISCUSSION

Many issues arise during the application and interpretation of the mark scheme. The Mark scheme for the Edexcel A2 Music technology 6717/01 (composition) is an assessment procedure designed within the framework of a national educational policy. The quality of the Mark scheme assessment criteria is central to the quality of teaching, learning, and the dissemination of knowledge. As Ramsden (1992) points out:

> *'The process of assessment influences the quality of student learning in two crucial ways: it affects their approach and, if it fails to test understanding, it simultaneously permits them to pass courses while retaining the conceptions of subject matter that the teacher wishes to change'.*

In order that a candidate score highly in this section there has to be a substantial amount of resources available to the institution, department, and teacher. An institution that offers this course therefore has to obtain the necessary funding to supply resources in order to deliver the course, that is if it wants to make available the higher grades to its candidates. Investment in music technology(ies) (mixing desks, recording equipment, sound-proofed facilities, etc...) has historically been expensive and, in terms of offering variety in courses, an unattractive option for all those but the more successful institutions. I believe the Mark scheme at this point penalises institutions that offer little in the way of technologically advanced.

Components within the mark scheme fail to test understanding but succeed at forging institutional level technological differentiation. The effectiveness of traditional teaching and learning methodologies can often be marginalised by the reliance on computer / hardware software. This is apparent in music technology where the course seeks to focus on, and develop, the individuals' I.T. skills

One solution deployed to combat this problem is to drive music technology(ies) into the "virtual" environment; a learning environment where computers replace traditional music technology hardware. A computer with sufficient technical specifications can in theory deliver music technology functionality, previously only available in professional recording studios.

Software synthesisers replace traditional analogue synthesisers. Synchronisation of digital audio and midi data becomes transparent to the end user – an important theoretical concept in the study of music technology. Quality and production of sound becomes less of an issue in terms of capital investment for the institutions (replaced now by a choice of preferred computer hardware and software application).

If ICLT resources are available it is possible to create a perceived learning environment which consists of many "virtual" professional recording studios.

This solution, at first, seems an extremely attractive option. Institutions can justify capital outlay on ICLT resources which includes both the hardware and software needed to complete the Edexcel A2 Music technology 6717/01 (composition) course. An investment in the "virtual" environment reduces capital expenditure on infrastructure and facilitates an increase in student numbers. Becta (2005) makes the following observation:

> *'Personal learning spaces place the learner at the heart of the education system, removing all the constraints of the classroom, and enabling anywhere, anytime learning combined with seamless continuity throughout their education.'*

Setzer (1997) makes an interesting, and somewhat poetic, observation:

> *'We have to radically change the educational process, but this change is not a technological one, it is a humane one. It is sad to see so much hope put on computers as saviors of the educational system, when it represents the continuity of its main problems'.*

Czerniewicz (2003) takes a more positive and didactic approach in terms of her view toward technology in education warning *' teachers still need to take responsibility as designers of learning. They require techniques, methods, and need to make informed choices regarding instructional strategies'*. She also makes the following observation:

> *'Computers in education are generally described in two common ways. The first is the use of computers as value-free, neutral tools (an instrumentalist approach, i.e. just the same as using a pen). The second is a techno-determinist understanding which suggests that the nature and use of computers causes pedagogical and other changes'.*

Wald (1999) suggests ICLT can be used to *"Encourage social interaction, discussion and collaborative working of both students and staff".*

Here the "Trojan horse" of the Mark scheme and specification manifests itself, as opposed to the overt values of ICLT in education, Government policy, and teaching for learning. The mark scheme covertly seeks to focus on, and reward, those centres that encourage "early adopters" of technological developments.

One of the fundamental barriers to learning often encountered in music technology is the basic configuration of PC's and software for musical manipulation. The use of communication software required to overcome this barrier unfortunately is outside the realm of our current technology.

The reliance on computer hardware to deliver lessons in music technology has a negative impact on learning styles. If students are encouraged to use computers and headphones and work in an "Atomised" environment then a number of innovative learners (McCarthy, 1980) would struggle to discuss their opinions and beliefs, dynamic learners lacking a variety of challenging activities. Therefore the risk of social exclusion is high in an institution that clearly encourages inclusive learning.

CONCLUSION

In terms of teaching for learning Repair Theory has highlighted a number of areas for development. Future lesson design and instruction should be supported by identifying at an early stage those learners that regularly follow incorrect procedures resulting in an impasse. Once identified an analysis of the learners meta-actions may reveal where a “buggy” repair has been made. This data can be used to empower the learner in completing the task.

Very clear and precise procedural flow charts should be available. These flow charts should clearly identify both combinations of procedures (physical and mental). This would enable the learner to review any repairs made and possibly correct any errors introduced in the procedure.

Assumptions can easily be made in terms of knowledge. It is easy to assume that learners are capable of opening and configuring an application when instructed. As this is not part of the assessment it all too often becomes marginalised as a tedious task. It could be argued that a needs analysis be performed (Kaufman, 1979). What we need to know as practitioners is the current ability of the learner and what assumptions, if any, we may have inadvertently made on their behalf. Rodger Kaufman (1982) has described this as identifying the gap in knowledge between what should be and what is.

A mark scheme that reflects a technological deterministic bias can only operate in the confines of either an institution with vast amounts of funding, or an institution that relies heavily upon its ICLT investment. The increase in technological reliance on curriculum delivery leads to the increase in virtual learning environments and with this comes a new challenge for teaching and learning.

The deployment of the hardware and software necessary to improve student achievement in Edexcel A2 Music technology will have a negative impact on the teaching and learning styles available to students and be counter-productive to inclusive learning.

Candidates from institutions with increased levels of ICLT will directly benefit from the Edexcel A2 Music technology 6717/01(composition) Mark scheme assessment procedure. It could be argued therefore that the mark scheme seeks to exclude those colleges in the Sixth Form Sector that have limited resources in terms of ICLT or professional recording equipment.

A recommendation would be to introduce more theoretical concepts of music technology that could be studied, and delivered, using a variety of teaching and learning methodologies. These concepts would not seek to rely upon the current ICLT investment within the institution to improve student achievement, but that of excellent teaching.

Students are covertly encouraged to pass subjects with very little resistance to their conceptions of the subject matter. The mark scheme should be amended to test “understanding” rather than highlight issues in the allocation of funding for success, teaching for learning, and social inclusion.

Derek Rowntree, (1987) stated that “if we wish to discover the truth about an educational system, we must first look to its assessment procedures”. At present there is no provision for the theoretical concepts of music technology in the Edexcel A2 Music technology 6717/01 (Composition) specification and therefore the assessment of student understanding is not reflected in the mark scheme. If future specifications and mark schemes continue to award, and encourage, institutions to provide the latest technology with little concern for subject delivery then the demands on teaching for learning in cyberspace will continue to grow. With this growth come many issues associated with distance learning, computer based training, and most importantly the student experience of learning itself.

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