AN INTERFACE TO SUPPORT CREATIVE STUDIO PRACTICE

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ABSTRACT

This paper will report on a series of empirical studies that began over a decade ago that has seen the development, testing and further re-development of an online resource used to support recording studio practice. The data for the study has been gathered from over 300 learners completing a first year module in Studio Production at undergraduate level. It examines the implementation and use of the resource from a pedagogical perspective. These have included interface design, knowledge types, problem solving, collaboration and mentoring. The types of data gathered over this period include over 400 hours of video data, 300 questionnaires, 30 interviews and the completion of 500 tasks in the studio. The purpose of this paper is to report the many highlights of the work so far, and signpost areas for future development.

1. INTRODUCTION

The motivation for this study is derived from a need to provide twenty-four hour contingent (on-demand) support for students completing practical tasks in the recording studio. Psychologists [1] have already demonstrated that learning at a time of need, or *contingent learning,* ensures greater retention of new knowledge. The ideas for this study also draw upon notions of *Experiential Learning* developed and identified by Dewey [2]. Therefore, if this approach could be adopted and used in the recording studio outside of the typical lecture or workshop students could benefit from receiving support pertinent to their individual needs. For example, a particular process or arranged combination of technical apparatus previously demonstrated in a formal teaching environment could be reinforced via the software.

The initial interface design was similar to the *minimal manual* approach described by Carroll et al [3] in that it attempts to build a bridge between complex technical manuals and provide support for real world tasks. This interface differs in that previous research concentrated on providing support for computer use within the architecture of the machine (such as help with a programming language). It was typical at the time for computing technology to emphasise functionality over usability [4] hence the need for support when using these text-based operating systems during this period of computing evolution.

There are similarities here with recording studio practice. Although there are several excellent texts that provide theoretical and procedural knowledge of studio practice [5] [6] these can sometimes not be specific to a particular studio or real-world task that a learner is trying to complete. The artefact or product that the learner wants to create is often the point of interest, and not how they arrived at this creative work (although this could be viewed separately or in parallel). Therefore, similar to a software engineer who may need support understanding the language (tools) to design a program, the student-recording engineer (or composer) will require support operating complex technical apparatus (such as mixing desks, signal generators and signal processors) to capture performance or realise a work.

The design of the interface is informed by developments in the area of intelligent tutoring systems [7], learning design [8], Computer Supported Collaborative Learning [9] and its implementation [10] as well as considerations such as Human Computer Interaction [11]. There are a number of empirical studies that has also informed the work and these include: Help Seeking [12]; virtual field trips [13]; computers as tutorial aids [14]; machine work in engineering [15]; and scaffolding problem solving with technology [16].

2. STUDIO RESOURCE

The interface is a multi-media web-based system with a secure login (see Figure 1). It consists of text, images and movie files that explain, highlight and demonstrate particular techniques or background theory concerning recording studio practice. The languages used to create the interface include php and perl (the latter is used to collect information about the types of pages the users are accessing including information such as time/date) and it is hosted on a sun box running Fedora Core 5.

Figure 1: Portal to the Studio Resource

Learners can access and use the interface in two ways. The first involves following four prescribed tasks that cover the basic elements of studio practice (recording, mixing and mastering). Students can follow the directions within the online workbook and complete the tasks in order (such as recording a spoken vocal) and access help (via hyperlinks) that reinforce points/techniques covered in lectures or workshops. In the example below (see Figure 2) a user was following the first task within the workbook (record a spoken vocal) and has accessed information concerning parametric equalisation. The support provided arrives as written text, an image and a separate movie file that covers both the theoretical and practical use of this signal modifier.

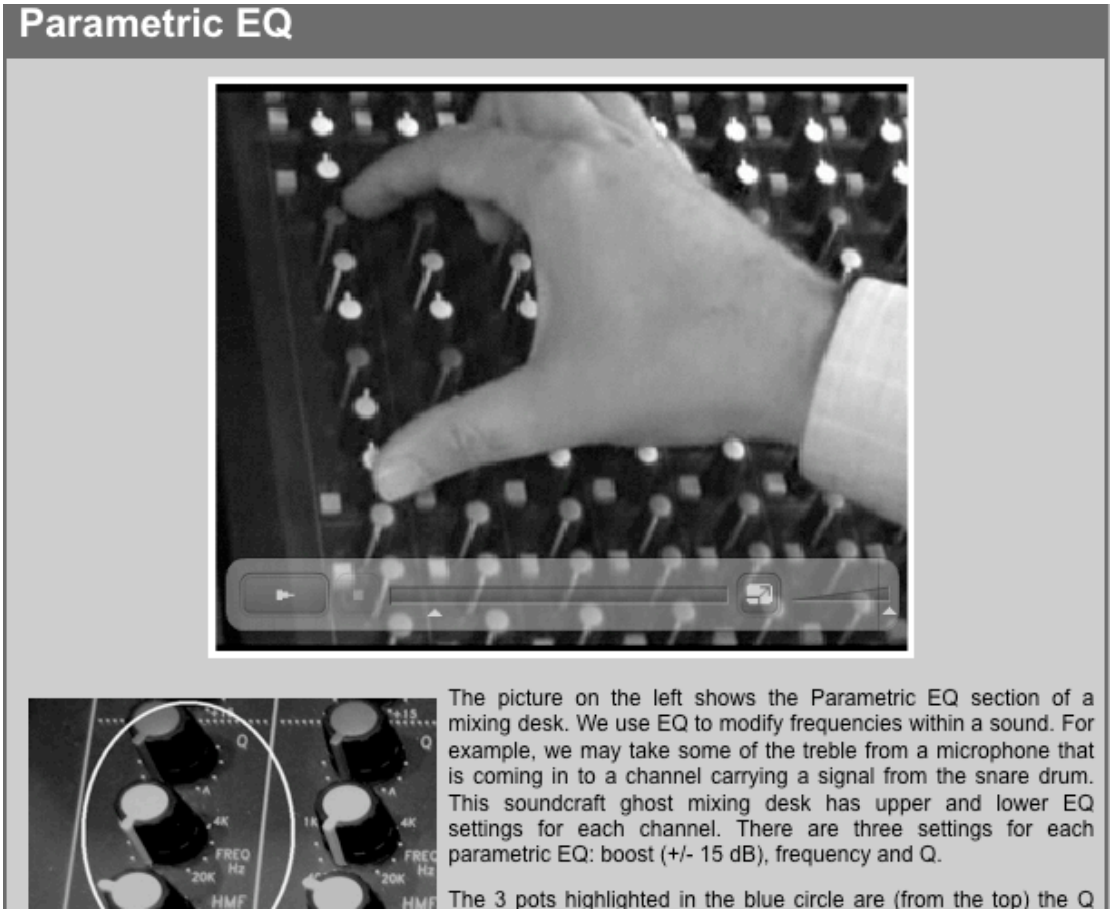

Figure 2: Access to information on Parametric Equalisation

The structure of the content within the system follows the pattern for a standard declarative network [17]. Figure 3 demonstrates a simple subset model applied to studio hardware:

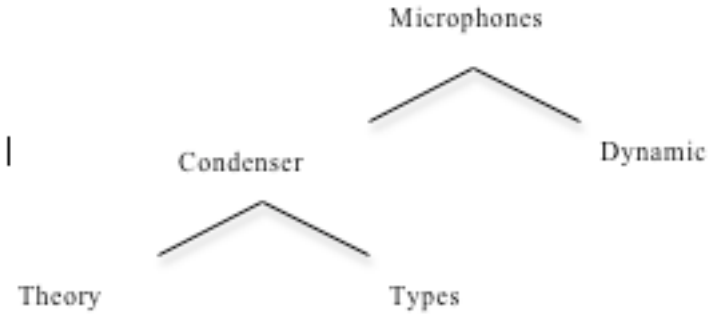

Figure 3: A subset to demonstrate knowledge about microphones.

The second involves freely browsing and searching the pages of the software to find the information pertinent to their needs. It follows the general rules for a perturbation [4] model of users in that assumes that some of the necessary expert knowledge has been previously assimilated, however there are errors or bugs that require fixing. For example, a learner may have mastered the ability to set up a channel to receive a signal from a phantom powered microphone yet they have not routed the channel to a recording device or the main studio monitors. Therefore, the interface can provide an overview of the procedure that can help the student identify the problem.

3. DESIGN & METHOD

The methods employed in the case studies associated with this interface include both mixed-method and qualitative research designs. The methods employed, materials and apparatus used, procedure and framework for analysis for each study are described in more detail elsewhere: problem solving [18]; collaborative learning [19]; contingent learning [20]; peer learning [21]; an expert in absentia [22]; and analogue and digital- a case study [23]. The total participants (n=300) for these studies were a purposive sample of undergraduates studying in the first semester of a music technology undergraduate degree (251 male, 49 female). The purpose of this paper is to draw together the various strands of this research to identify an approach to the development of a studio interface that has implications for both the musicians and the learning technology community.

4. INVESTIGATION

To date, there have been five major empirical investigations that have informed the development and the potential use of the Studio Resource. The areas examined have included: the design of the interface; knowledge types; the types of problems encountered by the learners; the use of learning technology in the recording studio; and the differences between analogue and digital pedagogical approaches to recording studio practice. The methods, apparatus, results and full analysis for these studies is documented elsewhere (discussed earlier). What are discussed here are the highlights of these projects and the potential development and possible signposts for future work.

4.1 Problem solving

The purpose of this study was to examine how useful the interface could be when students were trying to solve problems. It identified not only the types of problems encountered by the users but also compared the use of the software against more traditional methods of support. Using a stratified purposive sampling technique sixty-four (mean age=18.4 years) first year undergraduates studying for a degree in Creative Music Technology were divided into groups of two and were required to complete two tasks in the recording studio. One task was completed with the support of the studio interface and the second with handouts from recording studio practice workshops. A repeated measures design was used in the study and therefore an equal number of groups attempted each task with either the interface or the handouts.

Over 200 hundred hours of video data were analysed (using Bales Interactive Process analysis; [24]) and dual-coded (verbatim). The types of studio specific problems were thematically analysed according to production and post- production stages of studio work. The following common types of problem were encountered at the pre-production stage: 1) Phantom powering; 2) Setup of an external recording device (an HD24); 3) Signal routing; and 4) Use of auxiliary sends. In the production stage the issues were: 1) Signal processing; 2) General studio practice; and 3) Signal routing. In addition, a more task-related analysis revealed interesting data concerning: 1) Technical problem solving; 2) Planning/management of task; 3) Division of labour; and 4) Feedback.

The analysis of the data for this study revealed a number of interesting points. The direct comparison

between the use of the interface and the handouts demonstrated that: 1) The learning technology guaranteed resolution of a problem via an analysis of the critical incidents that occurred- *all technical problems were solved and this was not the case for the groups using the manual*; 2) A quantitative analysis (two-tailed t-test) of the types of problem solving involving trial and error were reduced for the groups using the interface; and 3) A two-tailed t-test between the groups revealed problems encountered were resolved more quickly for groups using the LTI. This was found to be highly significant ($t(30) = -2.34$, two-tailed, $p<0.02$).

4.2 Collaborative and contingent learning

This study investigated and examined the effects of learning technology on collaboration and contingent learning. There were 60 undergraduates involved (mean age=18.9 years) who were paired (following a pre-test) with a peer with similar ability (a socio-conflict approach) using a stratified purposive sampling technique. Sixty-four hours of video data were analysed and dual coded (verbatim). A mixed-methods research design was adopted and the quantitative data was analysed using descriptive/inferential statistics whilst the qualitative data analysis compared processes and interaction.

The groups were expected to complete a two-minute drum kit recording and a written test. When using the interface in these circumstances a two-tailed t-test revealed that: 1) Students gained a higher mark when collaborating with the interface; 2) Students using the interface completed the task more quickly; 3) A greater amount of knowledge was retained by the students in a post-test; and 4) There was no correlation between the time taken to complete the audio recording or the overall task itself. However, there was a strong correlation between the mark gained for the written test and a higher level of attainment. However, this was only evident when the groups had access to the studio resource.

The study also revealed four different types of patterns of collaboration between students, task and the support materials (which were either the interface or the paper-based studio handouts). These were: full; isolated; relay; and unsupported. 'Full' collaboration is when the students both accessed the support materials and also discussed and worked on the task together. 'Isolated' use occurred when the students used the support materials to find guidance for which then would then take back to the task to alter a parameter. 'Relay' approaches were demonstrated when one student accessed the support materials and then passed on the information to the other to action. Finally, 'unsupported' collaboration- when neither student-accessed support- was exclusive to the groups not using the interface.

Students using the studio interface demonstrated a greater level of improvement between pre- and post-test results. Written work was also completed to a higher standing when using the interface and the overall task was completed more quickly. In addition, students would use the interface for support rather than (in some cases) work unaided.

4.3 Peer learning

This pilot-study concerned the development of a peer-to-peer learning (or buddy) scheme between third year and first year undergraduates studying for a degree in Creative Music Technology. Nine first year students were split into groups of three (proceeding a pre-test) using a stratified purposive sampling technique: students of similar ability were group together- a socio-conflict approach. Each group was assigned a third year mentor who had completed a training scheme (in both studio practice and teaching technique). They were then required to complete a drum-kit recording with the help of the assigned mentor.

The results demonstrated that whilst there was no significance between the attainment and the time needed to complete the task (although the sample size was admittedly small) there was something interesting about the approaches taken by the mentors. What this demonstrated is that sometimes the mentors took more of an involved role in the physical act of solving the problem. This led to concerns that the some mentors had in fact not facilitated collaborative learning but had instead acted as technicians for the studio recording. This will need to be considered in future studies. In addition, data gathered from this study concerning the types of problems encountered informed the development of the interface and reinforced the findings of previous studies.

4.4 An expert in absentia

This investigation examined the use of the interface from the perspective of providing expert knowledge to students (n= 64, mean age = 19.1 years) completing a 10-week course in studio recording. They had to complete four practical tasks (vocal recording, stereo recording, a drum kit recording and a mix down) as well as a written workbook. This case-study attempted to answer: how they use the interface over the ten-week period; what type of support did they access; is there a correlation between use and attainment; and what themes emerged from the online discussion of the activities.

The pattern of usage over the 10 weeks demonstrated that students significantly decreased the number of times the interface was accessed over the first three tasks. However, activity increased around task 4 (perhaps because the focus of the assignment had shifted from recording to mixing). Microphone selection and theory, signal routing and input were the most accessed pages for tasks one to three. In task four the types of pages accessed centred on signal processors and generators. A thematic analysis of the forums discovered most of the discussions concerned students looking for instrumentalists for studio work and recording aesthetics: technical issues were not discussed.

4.5 Analogue or digital?

The most recent case study investigated the pedagogical differences between analogue and digital recording studios. A qualitative between subjects (n=50, age = 19.3 years) design was used and the students were divided up into groups of five (a stratified purposive sampling technique was used). All of the ten groups were required to complete a drum kit recording during a two-hour studio session with the support of a human mentor. However, half of the groups had access to a digital mixing console and the other groups an analogue console (for more details see [23]).

The main purpose of this study was to see what types of problems the students encountered and what support they required when using the different studios (whether analogue or digital). All the learners were at the mid-point stage of a fifteen-week recording course and had received tuition in how to use the studio assigned to them. A thematic analysis of the dual-coded transcriptions of the studio sessions revealed four core areas of support for studio use for both groups: listening/communication; patching; playback/recording; signal flow. However, within these themes the problems encountered were different for users of either the analogue or digital studio. For example, the analogue groups struggled to setup studio talkback, whilst the digital groups had issues assigning parametric equalisation.

5. DISCUSSION

The studio resource is currently going through a third re-design that will involve the development of a prototype to be made available as an application for an iPad. The knowledge contained within the interface will be further developed to recognise the most recent case study: Analogue or Digital? The interface has proven (so far) that learning technology can be an effective tool for providing contingent support to learners in the recording studio, that information can be retrieved more quickly, and it certain circumstances there is a correlation between attainment and use.

What are also of interest are the common types of problems encountered by students in the recording studio, and how they go about solving these issues. In addition, the differences between the types of problems encountered by using either a digital- or analogue-based studio bring attention to important concerns and considerations for educators.

It was the intention of this paper to draw together the empirical studies already complete and produce signposts for the future. The studies so far have concentrated on the following themes: collaborative learning; on-demand learning; problem-solving; computer-based learning; mentoring; and equipment types. Whilst this provides a comprehensive understanding of this contingent approach to studio learning more work is needed to redevelopment and test the interface on the latest software platforms.

The next stage of the development will be two-fold: to further investigate and model the design of the interface using an interactive touch screen; and to understand the differences and similarities between the theoretical and applied use of different studio platforms, and possibly examined from the perspective of technical apparatus from different manufacturers. In addition, further studies of different group sizes and types will also be investigated in a more longitudinal study of learning in this environment.

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