CETL Briefing Papers: Development and Assessment of Digital Interfaces for Performance.

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Aims of the Initiative

This project focuses on evaluation of current digital interfaces for performance. To identify the issues that make these not fit for purpose and to design, production and evaluate new digital interface methods for musical performance. This research also focuses on the use of these as formative assessment tools for this area

Description of the Initiative

This is a programme of research that will constitute a thesis for (practice-based) PhD. The research consists of a review of literature, the identification of difficulties with the digital interfaces in current use, and the provision of solutions to the difficulties found. Stage one of the research reviewed the academic and practice-based literature. This identified that current digital interfaces relied on the ability to write code. This is very difficult for (non-computer science) students to master and therefore created a barrier to their use of digital interfaces in the performance of music.

In response to these issues, a number of interfaces that utilise gestural interaction have been developed. These include:

- First, a gestural interface utilising a mix of off-the-shelf and custom built input devices.

- Secondly, an 8x8 tactile grid controlling a generative neural network with capabilities of sound and image generation.

- Thirdly, Eden3 – a musical interface for interspecies exchange (see www.eden3.net)

These have fed into the development of a software tool kit (provisionally called mat.lib, and created for the MaxMSP and Pd visual programming environments) to help students explore and understand the use of interactive and performative media, and adapt the product to their specific needs.

Again the literature in this area proposes that the current approach to teaching students how to produce and use digital interfaces for performance, utilise video demonstration. This approach is limiting as it demonstrates only one way of using the tool however, and does not encourage students to explore how to use and adapt the tool for their specific needs and usage. Once the new digital interfaces and tool kit had been developed, these were tested in workshop, exhibition and concert situations, and were evaluated by students.

In addition to the software that has been developed within this programme a new theoretical framework has been developed and implemented in teaching. This framework is based on a listening and improvisation approach to instrument mastery. This has been developed as instrument mastery not static and can change form, so leaning based on a static model does can impede learning in some students. Listening and improvisation approaches to instrument mastery are widely used in

musical education; however have yet to be applied in the teaching of orchestral and pop music.

Evaluation and impact of the Initiative

To date the newly designed digital interface has been tested on Undergraduates studying music. Utilising digital interfaces in music is usually taught at postgraduate level in the UK. Thus, the teaching of music performance through digital interface at undergraduate level is unique to the University of Wolverhampton. Although this digital interface is applied to the teaching and formative assessment of undergraduate music students, the digital interface provides other sensory outputs and has been applied to a number of other academic fields. This includes using the tool to produce visual art in Art and Design related subjects, aids the understanding of environmental awareness in Agricultural students and is of great interest to Computer Science students.

The impact of the digital interface on students at the University was evaluated through a structured questionnaire combined with observation, and was triangulated through evaluation within a workshop setting outside of the University. This evaluation indicated that approximately 50% students found the digital interface easy to use. Little correlation was found between students' ability with the digital interface and their previous education or prior musical experience. However, it was observed that a number of students who had difficulty with the digital interface also had difficulty with the conventional desktop interaction metaphor, which limited their interaction with multi media tools. This may have lead to difficulties in the students manipulating the new digital interface. This runs counter to the argument that the main barrier to the use of digital media is a lack of understanding of code or underlying mathematics. This requires further investigation. Attempts to rectify this have been made through extending the supplementary tool kit that supports students in the use of the digital interface, to include video demonstrations of using the tool, along with static text and interactive examples.

This research has also identified several cases of accelerated learning in students who have had little prior experience but have learned about and participated in performative digital media a lot quicker than the literature suggests is usual. There is nothing in these students' academic or training background to suggest that they were going to be exceptional in this field. However, evaluation (through questionnaires and empirical observation) suggests that these students were more willing than others to solve problems for themselves (an approach that is particularly well suited to the use of tool kits).

The outcomes from this research are now embedded into the teaching of Art and Design and Music students. These outcomes has been accepted and used by staff within SSPAL and SAD where staff have integrated the tool into their own teaching methods. Music modules (MT2000 Sampling & Synthesis, PM2009 Digital Audio Techniques, MU3014 Music and the Moving Image) in SSPAL have been adapted to use this software.

Policy Implications

- *Higher Education Sector*: Those who work in this area need to understand others' areas rather than specialise and not understand the possible overlaps and collaborative opportunities. This will help the field develop further.
- *International Market:* In the US, particularly at MIT's Media Lab (http://www.media.mit.edu/), the University of Minnesota (http://collaborativearts.umn.edu/), and New York University's ITP

(http://itp.nyu.edu/itp/program.php), digital media/media arts students gain more extensive experience in all areas of interactive media. If this was implemented in the University of Wolverhampton it could aid the understanding and uptake of digital media in performance, and the intersection of currently disparate programmes. However, it should be noted that this can be a relatively expensive model.

Business Case

- *Hurdles:* More integration between schools is necessary. Many Schools teach the same modules but have no contact. Collaboration between schools and will help as digital interface work is interdisciplinary. A closer relationship between music, computing and maths would help in the development of digital interface
- *Risk analysis of not continuing the programme*: This is a fast growing area, and is become prominent in music technology. Digital interfaces are used extensively by the media production, games and music industries. The continuation of this work is crucial if we want to help students develop into this field. Microsoft, Sony, Nintendo, and Yamaha are examples of commercial enterprises who are actively involved in the development and use of new digital interfaces.
- *Resource implications of the programme*: This type of work can be expensive in terms of hardware, requiring labs fitted with data projectors and high end laptops. However, software (often a major cost) may be less expensive, as interactive media and digital interface work often promotes the use of free and open source software.

Publications

Bouwer, A., Dalgleish, M., Holland, S. & Hurtig, T. (forthcoming 2010) Fostering Rhythmic Skills with the Haptic Drum Kit. In the proceedings of TEI 10, Massachusetts Institute of Technology, USA, (2010, January 25-27).

Bouwer, A., Dalgleish, M., Holland, S. & Hurtig, T. (2009) Feeling the Groove with the Haptic Drum Kit. In the Music Computing Workshop 2009, The Open University, UK, (2009, July 15).

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Dalgleish, M. (2008) The Neglected Histories of Live Electronic Music. In the Forgotten Modernisms Conference, Wolverhampton, UK, (2008, April 16).

Dalgleish, M. & Grose, R. (2007) The Silent and the Small. In CADE: Computers in Art and Design Education, Biennale of Electronic Arts Perth, Australia (2007, September 12-14).

Expert Contacts and Links

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