IMPLEMENTING ELECTRONIC PORTFOLIOS IN PRODUCT DESIGN EDUCATION: A CASE STUDY

Andrew Withell[1], Dr Stephen Reay[1] and Dr Olaf Diegel[1]

[1]School of Art and Design, AUT University, New Zealand,
andrew.withell@aut.ac.nz

ABSTRACT:

The growing importance of electronic portfolios as a teaching and learning strategy is reflected internationally in the large number of higher educational programmes and disciplines that have implemented electronic portfolios as a part of the curriculum and the teaching and learning process. Given the long history and tradition of paper based portfolio use in the creative disciplines and the link to initial electronic portfolio development, it is surprising that a comprehensive literature review indicates that there appears to be very little research into the implementation and use and of electronic portfolios as a teaching and learning strategy in art and design, higher education.

This paper covers the theoretical and historical background to electronic portfolio development in higher education, specifically the link between electronic portfolios, reflective practices and self-directed learning. The paper then presents a case study of an innovative electronic portfolio framework for product design students including the selection of appropriate electronic portfolio platforms, the development of resources and the process of implementation and evaluation.

Key Words: Student-Directed Learning, Electronic Portfolios

1. PRODUCT DESIGN AT AUT

The three-year undergraduate product design programme at AUT University was developed in 2007 and launched with the first intake of students in 2008. In 2010 the programme will have 75 students across the three years as well as five students studying at postgraduate level.

While the development of a new academic programme provides many organisational and operational challenges, it also presents a unique opportunity to develop new approaches to teaching and learning without the constraints of institutional history and tradition. An innovative pedagogical approach to product design is currently being developed in the product design programme at AUT that expands the definition of a 'product' to become a range of outcomes i.e. 'the product of' a creative design process. The emphasis is the on the 'design thinking' process as an outcome, rather than necessarily on the tangible, physical 3D products. Another key emphasis is the empowerment of students through student-directed learning including a focus on the utilisation of sound goal setting, planning, project management, design methods and reflective

practices. The electronic portfolio project, along with a number of other initiatives, plays a key part in the development of this innovative teaching and learning approach.

2. ELECTRONIC PORTFOLIOS

Electronic portfolios (also known as e-portfolios, efolios, digital portfolios, or web folios) are essentially electronic versions of paper-based portfolios. An electronic portfolio is the product, created by the learner, a collection of digital artefacts articulating experiences, achievements and learning. Behind any product, or presentation, lie rich and complex processes of planning, synthesising, sharing, discussing, reflecting, giving, receiving and responding to feedback. These processes – referred to here as 'electronic portfolio based learning' are the focus of increases attention, since the process of learning can be as important as the end product." (Joint Information Systems Committee., 2008, p. 6)

Ravet (2007) considers that an electronic portfolio is neither a product nor a process; it can be defined as the product created by a learning process. Ravet describes this product/process relationship as the process of collecting "authentic and diverse evidence, drawn from a larger archive, representing the capital developed by a reflective learning individual designed to exploit/valorise their assets in a particular context" (Ravet, 2007).

3. ELECTRONIC PORTFOLIOS IN EDUCATION

Electronic portfolios are a relatively new learning technology and are attracting significant interest from educators (Gerbic, Lewis, & Northover, 2009). However, the concept of a paper

based portfolio has existed for decades for personal and professional development and assessment (Ravet, 2007). In the creative industries of art, design and architecture paper based-based portfolios have a long history and tradition. Historically, "portfolios have long been the showcase tools of artists – expressions of competencies and work completed" (Buehler, Hafer, & Blankenburg, 2007). Over the years, artists have for maintained portfolios, often using their collections to seek further work or simply to demonstrate their art (Barrett, 2007).

Student electronic portfolios were initially developed from faculty assigned, print based student portfolios dating back to the mid-1980s, typically in art related programs and in disciplines with significant writing components such as English and communication studies (Lorenzo & Ittelson, 2005). Since the 1990s electronic portfolios have "taken the educational world by storm" (Meeus, Questier, & Derks, 2006, p. 134). The growing importance of e-portfolio development and implementation is reflected internationally in the large number of organizations and educational initiatives that use electronic portfolios. There are examples of electronic portfolio communities of practice that have been established in the Netherlands, the United Kingdom (UK), as well as the United States of America (USA) (Hallam, 2008).

4. ELECTRONIC PORTFOLIOS AND STUDENT-DIRECTED LEARNING

Student (or self) directed learning can be broadly defined as a process where students begin to take responsibility for their own learning processes. Knowles (1975) formulated what is perhaps the most frequently cited definition of student-directed learning: "A process in which individuals take the initiative in diagnosing their learning needs, formulating learning goals,

identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (cited by Lunenberg & Korthagen, 2005, p. 4).

There is agreement that electronic portfolios have the potential to "improve understanding of the self and the curriculum, to engage and motivate learners, both individually and as a part of the community of practice, to personalise learning, support models of learning appropriate to the digital age and to promote reflective practice" (Joint Information Systems Committee., 2008, p. 8).

Tosh and colleagues also consider that electronic portfolios are consistent with constructivist theory, as they are part of a student-owned, student-centred approach to learning which makes it possible for students to engage in their own learning, rather than just being the recipients of information (Tosh, 2005). Similarly, Lin (2008) suggests that because electronic portfolios are learner controlled, they have the potential to support student-centred and constructivist approaches to learning.

Central to the constructivist approach to teaching and learning is the embedding of reflective practices. There is a growing emphasis on reflective learning and practice in higher education. The use of reflection and self-analysis processes are associated with positive outcomes for students, including heightening student's abilities to think critically, be self-reflective, and set goals for themselves (Butler, 2006; Moritz, 2005; Smallwood & Hartnell-Young, 2007). There is agreement that electronic portfolios have the potential to "improve understanding of the self and the curriculum, to engage and motivate learners, both individually and as a part of the community of practice, to personalise learning, support models of learning appropriate to the digital age and to promote

reflective practice" (Joint Information Systems Committee., 2008, p. 8). Key ideas of the electronic portfolios are to enhance student directed learning through the use of effective:

5. ELECTRONIC PORTFOLIOS IN DESIGN EDUCATION

Portfolios have been used for assessing potential new art and design students, the assessment and presentation of student work and for students to present to potential employers (Neumann & Oberhuemer, 2007). Assessment portfolios illustrate a student's efforts and achievements in defined areas and can provide insight into learning styles, needs, and tendencies (Foley, 2008). Reflecting a broader trend, the tradition of portfolios in the creative industries has evolved with the development and implementation of digital computing over the last four decades. From the 1990s onwards, the creation, storing and the presentation of digital work has become the norm.

According to Blaikie (2004), the goal of a paper or electronic portfolio in the creative disciplines is to foster students' ability to critically self-assess their own artistic work, and to help them to form their artistic identity. Further to this Pereira de Eca (2005) notes that portfolios in art and design education are beneficial, as they enhance student motivation and engagement in learning, foster constructive learning, enable dialogue and co-operation between students and their teachers, provide valid and authentic assessment tasks that are related to the art curriculum, and respect the voices and personal styles of students (Pereira de Eca, 2005).

Given the long history and tradition of paper based portfolio use in the creative disciplines and the link to initial electronic portfolio development, it is surprising that a comprehensive

literature review indicates that there appears to be very little research into the implementation and use and of electronic portfolios as a teaching and learning strategy in art, design higher education.

6. IMPLEMENTING ELECTRONIC PORTFOLIOS AT AUT

The Product Design programme at AUT University, School of Art and Design received a grant from the Centre for Learning and Teaching to develop, implement and evaluate a pilot electronic portfolio project with undergraduate Product Design students. The aim of the project was to support students to begin to develop, manage and drive their own programme of study through the use of electronic portfolios as part of a broader teaching and learning strategy promoting student-directed learning. The project was undertaken over the second semester of 2010, with 50 second and third year product design students. Students were asked to create an electronic portfolio as part of their ongoing design work over one semester of a product design, studio class.

To begin the project, a comprehensive review of existing literature was undertaken to identify existing research on electronic portfolios, and to analysis theoretical models, frameworks, software platforms, as well as practical and applied approaches to the use electronic portfolios in higher education. The findings of this initial background research were used to develop a framework leading to the implementation of the pilot project at AUT.

A number of key principles were identified through the literature review as central to the use of electronic portfolios in the Product Design programme at AUT. This included the utilisation of constructivist approaches to teaching and learning

to facilitate student 'ownership' and engagement, the embedding a level of student control, and developing a platform/structure for the electronic portfolios that was appropriate for product design students. The focus on the use of electronic portfolios as a 'process of learning' rather than an 'end product' was deemed as critical to the project, specifically the use of electronic portfolios to support, drive independent learning by facilitating:

- Personal goal setting and planning

- A structured design process and sound project management

- Ongoing documentation, analysis, and selection of design process work

- Ongoing critical self-assessment and reflective practices

- Collaboration between students and tutors through the sharing of digital artifacts

- Presentation work for assessment

- Digitally archiving of work.

7. SOFTWARE PLATFORMS

A review was undertaken to identify a suitable electronic portfolio software platforms for the project. The Blackboard Online Learning system is currently used as the primary gateway to electronic learning at AUT, but the review indicated that while it does have a simple portfolio component, it does not provide the capability for the generation of highly visual electronic portfolios as appropriate for design students. It was important however that the project was carefully integrated into

the current substantial use of Blackboard by the programme. After careful consideration Mahara, a New Zealand developed, open source electronic portfolio software platform was selected as the primary portfolio system. Mahara offers a simple easy to use interface, with goal setting, artifact depository area and social networking capabilities. Access to Marahra was enabled through individual classes in Blackboard to better integrate the two software platforms.

In addition Adobe Indesign was selected as the specific software for the creation of the individual electronic portfolio artifacts. The utilisation of Adobe Indesign allows a relatively standardized platform for documentation and organisation of visual images including drawing, photography, and other presentation material, as well as the potential for personalised design and layout, which fundamental to the approach of design students, and the ability to export PDF files. The development of in-depth skills in desk-top publishing platforms such as Indesign is good the student's professional capabilities.

8. RESOURCES

To support the integration of the project into the studio programme a number of extra resources were developed. Central to this was the development of a Design Methods Toolbox to provide the students with a clearly defined design process structure and the appropriate design methods to underpin the design work. Thirty-six key design methods were identified as part of a six-step, conceptual product design process. Each of the design method resources consist of a PDF document containing background to the method, key steps in use, templates and examples based on best practices by other

students. In addition key links to more detailed resources and

examples are provided for students explore independently.

DESIGN METHOD
[toolbox]

Figure 1: Design Methods Toolbox Interface.

Following this, Adobe Indesign templates were developed and given to the students as the basis for the development of portfolio artifacts. The templates were structured using key section headings reflecting the six step design process of the Design Methods Toolbox. The goal of the template was to provide a very basic layout and structure, as well as critical information, for students. For example specific areas were identified for students to write self reflection pieces. It is important to note that the students were encouraged to take full ownership of the electronic portfolio artifacts by further developing and personalising the templates before using to document work. In addition to this the students undertook a total of five intensive workshops in the fundamentals of the Adobe InDesign portfolio creation process and PDF publishing.

9. FRAMEWORK

The following diagram represents the overall online framework developed for the implementation of the electronic portfolio project:

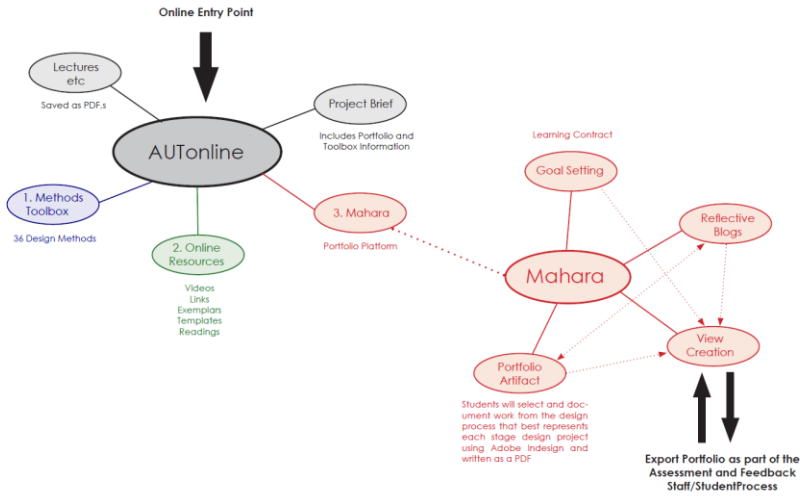

Figure 2: Electronic Portfolio Framework.

Portfolio Processes

Students were asked to create and publish electronic portfolio artifacts of their design work over one semester of the product design studio paper which includes two six-week product design projects. In addition to the usual project briefing the product design project briefs were written specifically to include instructions around the electronic portfolio artifact creation as part of the design work, and the use of the Design Method Toolbox. It is important to note that the students work in an open studio environment and are encouraged to create many 3D prototypes and models in addition to drawing and other

creative work. This creative environment can also be chaotic, messy and not necessarily conducive to a highly organized work processes.

Student adoption and engagement with electronic portfolios are critical factors in the successful development and implementation of long term electronic-portfolio programmes. Using this approach, the students were carefully introduced to the concept of electronic portfolios as a teaching and learning strategy with the goal to enhance their learning as part of a detailed briefing at the beginning of the semester.

In the first, year-two project, students were asked to redesign an existing product based on improving personal health and wellbeing. To start the project, students were asked to develop and publish on Mahara a number of personal academic goals based on achievement at various stages of the design process. This was critical as a mechanism for and the ongoing, critical self-assessment and reflection process.

Throughout the design process the students were then asked to electronically document their research and physical 2D and 3D design process work using appropriate methods, including such as scanning and photography as an ongoing process. They were then asked to select examples of this work to be placed in the portfolio artifacts. The students were counseled to think carefully in the selection process to select examples that 'best represent' their product design process work.

In addition the students were asked to write descriptions about the process work, and to write critical reflections using their personal project goals as a reference. Fundamental to the portfolio creation is the documentation, selection and reflection cycle that underpins the use of electronic portfolios as a teaching and learning process learning rather than as an outcome. Finally students were then asked to place their

portfolios artifacts as they developed on Mahara to share with other students and to gain formative feedback from tutors over the six week design process.

10. EXAMPLES

The following is examples of electronic portfolio artifacts created by student during the design process and placed on Mahara for sharing and feedback:

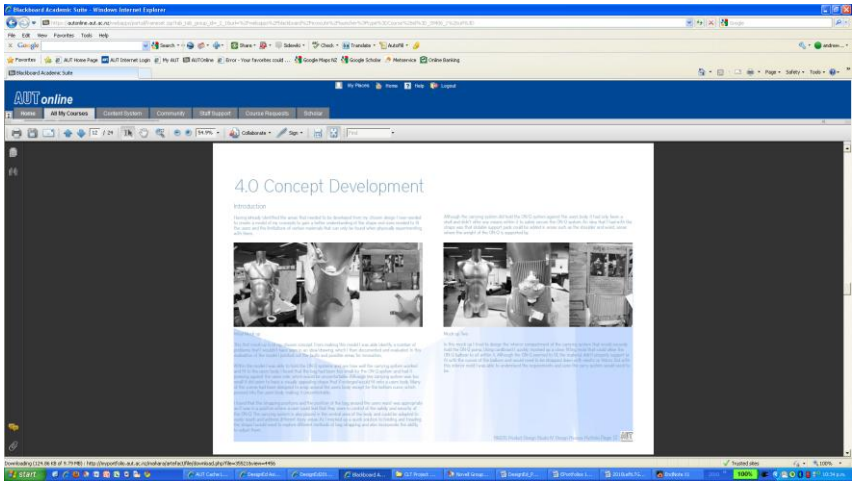

Figure 4: Example of electronic portfolio artifact.

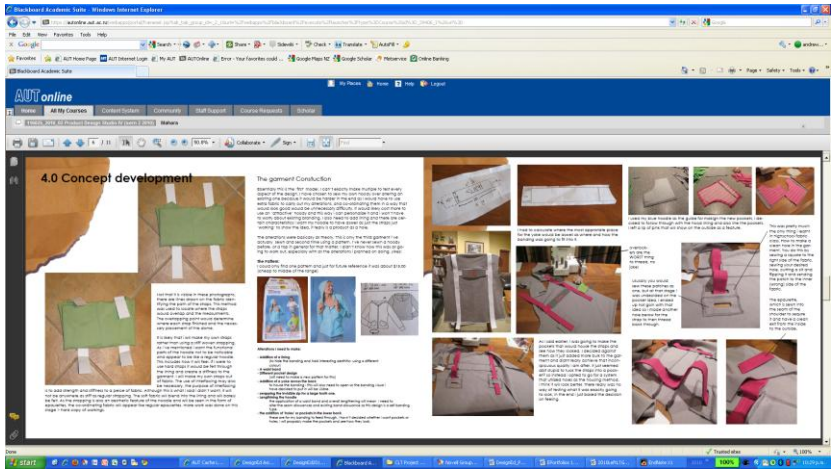

Figure 5: Example of electronic portfolio artifact.

11. EVALUATION

At the time of writing the implementation of the pilot project is drawing to a conclusion. The review of literature indicates that there is very little research on tertiary students' perceptions of the value of electronic portfolios to their learning and this offers a unique opportunity for this project. The project will be evaluated at the end of the semester to assess the success and for potential 'rollout' to other programmes and schools in the faculty.

A selection of students and staff who have been using the developed resources will be surveyed using a questionnaire on the usefulness of the electronic portfolio framework, of specific information and resources provided, and their satisfaction with the approach. In addition specific questions will focus around student understanding, buy-in, appropriateness of the software, and most importantly the role that electronic portfolio plays in facilitation the of student-directed learning.

12. CONCLUSIONS

This paper has presented the background, development and the implementation of an innovative project in the product design programme at AUT University aimed at promoting student-directed learning through the use of electronic portfolios. It appears that while electronic portfolio use is now widespread at a higher education level especially in the education discipline area there appears however to be little research on the use of electronic portfolios as a teaching and learning strategy in Art and Design higher education.

Although the project has not been formally evaluated at the time of writing, number of key issues appears to be emerging from the project. Initial anecdotal feedback from students indicates:

- A mixed level of engagement from some students with some not yet use to the ongoing, documentation, selection and reflection cycle.

- Many students are initially slowed down in their design work by the extra load of documentation and portfolio creation while they learn the new software.

- Some students are reluctant to self-reflect their work on an ongoing basis and not finding the right depth and criticality in their language.

- Students however are enjoying having a more structured approach to the design process and the Adobe Indesign templates are assisting with this structure.

- Many students haven’t yet personalised the portfolio artifacts to the extent they could.

- The Design Methods Toolbox appears to be useful in underpinning the design process and providing a gateway for further independent exploration.

- The use of electronic portfolios seems to be bringing some order to the 'chaos' of a physical, creative environment.

- Overall students are beginning to see the benefit of electronic portfolios in the design process, and can see the benefit of digitally collecting their work for the future.

From a tutor perspective, it appears that there has been already been an immediate benefit in the use of electronic portfolios for assisting in the structuring and teaching of student design projects. In addition the use of electronic portfolios has been beneficial in assessment, moderation and feedback processes, as well as the documentation and digital archiving of student work for the product design programme. This will provide examples of best practice for future students, as well for the future development of the electronic portfolio project.

To this point it appears that the project will need further development and refinement, and that it may take time to develop a 'culture' of electronic portfolio use in the programme but the long term benefits however appear substantial.

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