

Section Two

1. Project Outcomes

The project is progressing as planned. Initial findings continue to be published widely (see Section 4).

Key findings include:

- More work is needed to help prepare students to use metadata (e.g. keywords and descriptions) for cataloguing and searching resources. Academic staff need to work with librarians to formulate an agreed (and controlled) keyword vocabulary and students need more training in how to select keywords and formulate resource descriptions.
- Student information literacy skills are patchy and are not taught extensively in engineering curricula.
- The workflow, legal issues and metadata applications of the LauLima Learning Environment and LauLima Digital library result in extensive education requirements for both staff and students. There are responsibility and workload issues at course, departmental and institutional levels.
- There is a potential conflict between student creativity and compliance with digital copyright laws.
- Designers search and learn differently when dealing with text-based information as opposed to video-based information. They prefer to access text-based information when they are interested in retrieving formal knowledge such as specifications. This type of search can be characterized as deep and narrow. On the other hand, designers prefer to access video-based information when they are interested in retrieving informal knowledge such as design concepts. This type of search can be characterized as shallow and broad and resembles “browsing” more than searching.
- A video-based documentation paradigm in engineering design projects allows for the automatic capture and indexing of informal design knowledge, which has constituted a major barrier to tacit information reuse. A paradigm shift from text-based documentation to video-based documentation in design projects should be explored.
- Existing summarization and representation schemes for video data are not effective in conveying a quick “sense of content” to designers seeking information. New visual summarization methods need to be developed.

Design and implementation of current and future work-packages will attempt to address these problems.

Students involved in DIDET projects will be offered lessons and support in information retrieval and management. It is planned to incorporate these into project sessions to provide situated learning and problem-based learning opportunities which are intended to improve the educational experience of students.

The Department of Design Manufacture and Engineering Management will work to embed information literacy into the undergraduate curriculum through the modification of a core 1st year class *Integrating Studies*. The University Engineering Librarian has been involved in the initial stages of this work. This is a significant step forward in embedding the DIDET experience within Strathclyde. All work in this area has been planned to be sustainable in the longer term. This work will inform partners at Stanford.

It is expected that planned Information Literacy sessions will have a significant impact on the way students use other repositories and information sources, such as EEVL and SMETE.

The key objectives (in addition to the objectives of the work packages identified in the project plan) for the next planning period are:

- To develop materials to improve student information literacy skills.
- To identifying ways to measure the impact of a shared workspace and repository on the learning of the students. It is hoped that reflective learning opportunities may provide some positive information on this.
- To identify and test practical ways to begin collaborative work with Stanford/Strathclyde students given the constraints of credit ratings and timetables.
- Evaluation for the next academic session will focus on specific issues within identified teaching modules. For example, reflective learning within one module, applying metadata in another.
- To update the “digital library” by identifying and enabling access to digital resources, improving searching and browsing functionality and defining a controlled “search vocabulary”.
- To develop a controlled experiment to monitor and evaluate student use of information resources when conducting design tasks and evaluate such use in the ‘quality’ of the design produced.

2. Intellectual Property Rights

Currently there are no problems between the partners but a formal collaboration agreement has yet to be signed.

A submission has been made to the recent call ‘IPR in International e-Learning Programmes’ from HEFCE, UUK and SCOP.

3. Evaluation

Evaluation is an ongoing element of the project (Work Package 12). Results of the evaluation are being published (see Section 11).

The required skills and conceptual understanding of the design students in relation to their use of digital resources is decided in partnership with the lecturers and through discussions and team meetings. These requirements are discussed at project meetings, convenors’ meetings and class teaching meetings.

Evaluation was carried out using a variety of methods; observation, focus groups, questionnaires, reaction cards, feedback sessions; analysis of groupware files. For example, the evaluation of our initial pilot project used a variety of methods. It focused primarily on students’ and teaching staff’s perceptions and experiences. An evaluator observed and met with teams in *focus groups* for 10 minutes during the 1 hour weekly class studio sessions. At the beginning of each class, *one minute reaction cards* (cards with 4 questions to be answered by students) were handed out. The cards were gathered in at the end of the class. In week 3, during the team presentations (for assessment) *staff observed and discussed* with teams the effectiveness of their information structures (linked Wiki pages). Some of these sessions were recorded by the evaluator. At the end of the project, a *feedback session for each team with 2 members of staff* allowed both staff and students to give feedback on their overall experience and project outcomes. Also, at the end of the project there was a *focus group meeting with all the teaching staff*. Objective data was provided through weekly *analysis of TikiWiki (Lau Lima) team pages and files*. This provided information about how students had interacted with the resources, what metadata they had created etc.

This project is not solely aimed at evaluating teaching materials but also focuses on evaluating the use of students’ generation, management and sharing of information and resources in shared workspaces. The evaluation has shown that student generated resources in shared workspaces support design learning. They help students develop a shared conception of the design problem and they support collaborative working to produce a design solution. However, the evaluation has also shown that students’ require preparation and opportunities to reflect on how they search for

resources and how they structure and manage these in workspaces (ie information literacy skills). In terms of reuse of resources, so far, the project has identified the need for two repositories – a workspace environment (e.g. LauLima Learning Environment (LLE)) and a digital library (LauLima Digital Library (LDL)) with resources moving from the workspace (LLE) to the digital library (LDL).

In the next reporting period we aim to:

- Examine the issues involved in the movement of resources from the Learning Environment to the Digital Library, going from the informal to the formal.
- Examination of a global team project using the Learning Environment (focusing on communication and resource sharing).

4. Dissemination

No direct publicity during reporting period.

The project re-launched its website: <http://dmem1.ds.strath.ac.uk/didet/> during the reporting period. In addition a project logo, A4 'flyer' and 'corporate' image has been designed.

Neal Juster demonstrated the Informedia software and its use in the project at the JISC conference in Birmingham at the end of March 2004.

The following papers have been written and published/presented:

1. Ion W J; Wodehouse A; Juster N; Grierson H and Stone A; 'Educating the Global Designer' in; *Perspectives from Europe and Asia on Engineering Design and Manufacture*, Yan X T, Jiang C and Juster N P (Eds), pp225-236, Kluwer Academic Publishers, Dordrecht, The Netherlands, 2004. ISBN 1 4020 22115
2. Wodehouse A; Grierson H; Ion W J; Juster N; and Stone A S; 'The impact of documentation and reflection on student learning in engineering design' in; *Perspectives from Europe and Asia on Engineering Design and Manufacture*, Yan X T, Jiang C and Juster N P (Eds), pp337-346, Kluwer Academic Publishers, Dordrecht, The Netherlands, 2004. ISBN 1 4020 22115
3. Grierson H; Nicol D; Littlejohn A; Wodehouse A; 'Structuring and Sharing Information Resources to support Concept Development and Design Learning' in *Networked Learning Conference*, April 2004.
4. McGill L; 'Lost in Translation: trying to decipher the differing perceptions of eLiteracy', *ELit 2004*, New York, June 2004
5. McGill L; 'We DIDET with Tikiwiki: supporting student learning with a digital repository', *4th Annual National VLE Conference*, University of Bristol, July 2004

The following papers have been accepted and are awaiting publication/presentation

6. Juster N P; Grierson H; Nicol D; Ion W J; Stone A; Wodehouse A; 'Using digital libraries to enhance distributed design team performance' *Proceedings of ASME Design Engineering Technical Conferences*, Paper Number DETC2004-57600, September 2004, Salt Lake City, Utah, USA.
7. Ion W J; Stone A; Grierson H; Wodehouse A; Juster N; 'A Study of Student Learning in Design Projects', in *Proceedings of the International Engineering and Product Design Education Conference*, Delft, The Netherlands, September 2004.

8. Wodehouse A; Grierson H; Ion W J; Juster N; Lynne A; Stone A L; 'TikiWiki: a tool to support engineering design students in concept generation', in *Proceedings of the International Engineering and Product Design Education Conference*, Delft, The Netherlands, September 2004.
9. Grierson H; McGill L; Littlejohn A; Nicol D; 'Supporting Student Learning through Use of a Digital Repository – the DIDET Project', ALT-C Spring Conference
10. Wodehouse A; Grierson H; McGill L; Ion W; Juster N; Stone A; 'Efficacy of a digital repository for retrieval, storage and use of technical information in a student product development project' in *Proceedings of the Advanced Engineering Design Conference*, Glasgow, September 2004
11. Nicol D J; MacLeod I A; 'Using a Shared Workspace and Wireless Laptops to Improve Collaborative Project Learning in an Engineering Design Class', *Computers & Education*, in press.

The following papers are under review:

12. Nicol D; Littlejohn A; Grierson H; 'The importance of structuring information and resources within shared workspaces during collaborative design learning', submitted to *Open Learning*, August 2004
13. Eris, O; Mabogunje, A; Leifer, L; Jung, M; Khandelwal, S; Neeley, L; Hutterer, P; Hessling, T; 'Capturing and Reusing Tacit Knowledge via Video: a Paradigm Shift in Engineering Design Documentation' in *Proceedings of the International Conference on Engineering Design*, Melbourne, August 2005.

Plans are to continue publishing in conferences as results become available and to produce at least two good journal papers a year.