

JISC/NSF Digital Libraries in the Classroom Programme

Biannual Progress Report

Reporting Period: 1 March 2006 – 31 August 2006

Project Acronym	DIDET (Digital libraries for global distributed innovative design education and teamwork)
Project Title	Accelerating Globally Distributed Team Innovation: Building an Experimental Testbed to Leverage Digital Libraries in the Transformation of Design Engineering Education
Lead Institution	University of Strathclyde (for JISC) Stanford University (for NSF)
Project Director (Stanford)	Professor Larry Leifer Centre for Design Research Department of Mechanical Engineering Stanford University Stanford CA 94305-2232 Voice: (650) 725-1588 Fax: (650) 493 6481 Leifer@cdr.stanford.edu
Project Director (Strathclyde)	Professor Neal Juster Pro Vice-Principal Professor of Computer Aided Engineering University of Strathclyde McCance Building 16 Richmond Street Glasgow G1 1XQ Tel: 0141 548 4319 Fax: 0141 548 4718 n.p.juster@strath.ac.uk
Project Manager (Strathclyde)	Caroline Breslin Project Manager Learning Services University of Strathclyde Alexander Turnbull Building 155 George Street Glasgow G1 1RD Tel: 014 548 4121 Fax: 0141 548 4216 caroline.breslin@strath.ac.uk
Report produced by	Caroline Breslin, Hilary Grierson, Carol Dunbar, Ade Mabogunje, Ozgur Eris

Section One

Grant Statement

I confirm that the project is being conducted under the terms agreed with JISC/NSF in the letter of grant and the terms and conditions attached to it.

1. Aims, Objectives and Methodology

There have been no substantial changes to the aims, objectives and methodology detailed in the updated Project Plan submitted to JISC in September 2005.

2. Overall Approach

There have been no substantial changes to the overall approach in this period.

3. Workpackages

WP1 – Initial Library Specification:

Completed prior to current reporting period (August 2003).

WP2 – Implement DIDET Library v1:

Completed prior to current reporting period (October 2003).

WP3 – Student Use of DIDET Library v1:

Completed prior to current reporting period (May 2004).

WP4 – Specification of DIDET Library v2:

Completed prior to current reporting period (September 2004)

WP5 – Implement DIDET Library v2:

Completed prior to current reporting period (December 2004)

WP6 – Student Use of DIDET Library v2:

Completed prior to current reporting period (September 2005)

WP7 – Specification of DIDET Library v3:

Completed prior to current reporting period (September 2005)

WP8 – Implement DIDET Library v3:

Completed prior to current reporting period (September 2005)

WP9 – Student Use of DIDET Library v3:

Commenced October 2005, continuing until February 2008 and beyond.

Students began to use version 3 of the LauLima digital library (LDL) at the beginning of the academic year in October 2005 as scheduled in the project plan. The browse and search facilities are now demonstrated to students in relevant classes and all content which has been submitted by staff and approved is made available for retrieval. This will continue as planned and is of greatly increased benefit to students now that the number of resources submitted to the LDL to date is over 500 with each resource being indexed by class. Evaluation of the LDL and its use is planned for the coming year, with an emphasis on its use in the new Global Design class at Strathclyde.

WP10 – Global Team Design Project:

Commenced July 2005, due to be completed June 2007

As reported by Strathclyde at the meeting with the programme manager and evaluators in September 2005, the project has determined that it will be more effective to run joint a joint *element* of classes at Strathclyde, Stanford and Olin rather than developing a complete new module shared between the institutions. This overcomes issues relating to different course structures.

The Global Team Design Project is a collaborative team project which is being run as an assessed joint element of compatible courses at Strathclyde, Stanford and Olin. The project will be launched at the start of academic year 2006/2007 as part of new classes at Strathclyde and Olin, and as part of an existing class at Stanford.

As reported previously, DIDET team members from the USA and the UK met at Olin College of Engineering, Needham, MA, USA on 13-14 February 2006 where constructive progress was made on the nature of the joint project. Development of the joint project has continued via email, videoconference and using a dedicated joint working area on the LauLima Learning Environment to which all three sites have contributed effectively to date.

Within this reporting period, the new classes at Strathclyde and Olin have been proposed and approved at both institutions. The three sites have shared class information to ensure that all 3 classes are compatible for the collaborative project element; we have agreed that the educational aims, learning outcomes, syllabus and assessment methods and criteria are well matched. The Global Team Design Project will be part of a new fifth year class named *Global Design* at Strathclyde which is an elective class available to Masters level students and the new class at Olin College is *Distributed Engineering Design*. At Stanford, the collaborative Global Team Design Project will be incorporated into the existing *Design Theory and Methodology - Distributed Design with Digital Libraries* class.

Following discussion and development work between all three sites, Strathclyde developed a first draft of the design brief for the student project which was agreed by Stanford and Olin. Student teams will design a coffee cup holder for 2 cups of coffee and Strathclyde, Stanford and Olin have been further developing the task definition, performance measurements and assessment for the project. So far Strathclyde has set a timetable for the class and drafted a week by week class plan, both of which have been approved by Stanford and Olin so far. The weekly class plan includes details of the weekly lecture topic, suitable case studies and resources to relate to it, a tutorial exercise for students and any deliverables that the students must develop. Strathclyde have now begun arranging teaching team meetings to progress detailed planning for the class and enable the development of teaching materials. Strathclyde, Stanford and Olin have agreed to increase the regularity of the videoconference to once a week rather than once a fortnight from now until the project has ended.

Strathclyde intends to use DMEM's new Digital Design Laboratory for the Global Design Project and classes will be held on a Monday from 2pm - 5pm and on Wednesdays from 10am - 11am.

Expected numbers for the Global Team Design Project are 28 in total; Olin already have 8 students registered, Stanford are expecting 6 and Strathclyde are expecting 15-20, but can cap this at 14 to tie in with Stanford and Olin's class numbers if necessary. Ideally we plan for each student team to have 2 USA students and 2 UK students each, but we must wait for final numbers from Strathclyde and Stanford before this is finalised and neither institution will know until the beginning of the academic year how many students are registered.

The LDL has been configured to allow both Stanford and Strathclyde their own digital libraries in LauLima, but to allow each of the three sites access to the resources within both. As reported in the

previous 6-monthly report, this was devised in order to overcome the fact that information law is very different for the USA and the UK so rather than compromise procedures for all sites, we are able to work within our own respective legal frameworks. We have also begun to compile a list of tools that will be used as part of the class. To date, this list includes the LauLima Learning Environment and Digital Library, Informedia (a new, web-based version), whiteboards (which students find easy to use and quick to photograph and share) and external file sharing and messaging tools, such as MSN Messenger¹ and You Tube.²

WP11 – Rollout of DIDET Library:

Commenced August 2005, due to continue until February 2008 and beyond.

Other than to support teaching and learning in DMEM, there have been two further separate uses of LauLima for other purposes. Firstly, the DIDET team has supported staff in the Information Resources Directorate who used LauLima as part of an ESRC funded project to establish a multi-disciplinary knowledge network to study the impact of higher education institutions on regional economies. This project was being led by the Centre for Public Policy for Regions³ who are working collaboratively with the Universities of Strathclyde and Glasgow and other related organisations. As reported previously, a version of the LauLima system has also been installed in the Department of Mechanical Engineering at Strathclyde. It is being developed to be used to support a help facility for WebCT users at the university.

Based on the use of LauLima so far, we have now published four separate case studies which demonstrate the range of potential uses of the system. We have two teaching and learning case studies which focus on the use of LauLima in the classroom for the IDP and PDP classes at Strathclyde. There are two further case studies based on the use of LauLima by staff in the Information Resources Directorate and the Department of Mechanical Engineering as described above. All four case studies are available on the DIDET website and have been written using the *Effective Practice with e-Learning* template developed by HEFCE.⁴ We will continue to ask all potential users of the system to assist with case studies which can be developed and published as appropriate.

The LauLima system is now available for download via the DIDET website. We are able to record details relating to download of the software so that we can analyse how many downloads are made, from where, and so on. We will also request that those using the system cooperate with the production of case studies so that we are able to use this information in our final 'roll-out' of models of use of the tools.

We continue to promote the project and the use of LauLima within Strathclyde and externally (see Section 15 on Dissemination). Prior to LauLima being available for download, we received two enquiries about using the system. Firstly from the Educational Development Unit at Napier University who had seen a talk on the project and would like to investigate its potential for use. Secondly, from a PhD student at the University of Nottingham who is researching the area of web-based education has installed Tikiwiki to use in his studies. He now wishes to review the LauLima source code and learn more about the project.

WP12 - Evaluation:

Commenced March 2003, continuing until February 2008

¹ www.msn.co.uk

² www.youtube.com

³ <http://www.cppr.ac.uk/>

⁴ <http://www.hefce.ac.uk>

Evaluation continues in the classroom through observation, class questionnaires, reflective blogs, examination of student material on the LLE, student and staff debriefing sessions and student team interviews. Use of the project digital libraries (LauLima Digital Library and Informedia), the new Global Design Classes at each institution and the joint Global Team Design Project will be the focus of continuing evaluation. For details of evaluation undertaken in this reporting period and development of the evaluation strategy, please see Section 11. The DIDET team across the USA and the UK has also recently reviewed its evaluation strategy, please see *Progress Against Key Objectives* in Section 9.

WP13 – Digital Libraries in the Classroom Dissemination:

The dissemination contact for the DIDET Project is Caroline Breslin who attended the last joint dissemination meeting on 28 and 29 March 2006 at Ross Priory along with Neal Juster from Strathclyde. Caroline represented DIDET alongside the other 3 programme projects at the London JISC Regional Support Centre's Elearning Jamboree on 6 July 2006 at Kensington Town Hall. DIDET was represented by a poster display, project flyers (updated in July 2006) and a laptop running a demonstration of LauLima. The four projects on two exhibition stands were busy giving demonstrations and dealing with enquiries for much of the day. DIDET has also had a full paper accepted for the ECDL⁵ workshop on *Critical Success Factors for Institutional Change*⁶ in September 2006 being chaired by Hugh Davis of the DialogPlus Project and Susan Eales, formerly Programme Manager for *Digital Libraries in the Classroom* (DLIC). Caroline has participated in all DLIC Dissemination telephone conferences to date and reports back on progress to the rest of the project team. A dedicated area on the LauLima system has been set up by Caroline Breslin and Andrew Lynn where all of the DLIC dissemination coordinators, JISC's Communications Manager (Sara Hassen) and the DLIC Programme Manager (Lou McGill) have access to create/edict/delete wiki pages and upload and link to files in a dedicated 'file gallery' storage space. To date, this area has been effectively used by all to develop ideas, link to each new version of the project plan and maintain pages for meeting minutes that can be edited by all. All DLIC projects have agreed to lead on one journal paper relating to the programme and work has begun on this at Strathclyde. Caroline has also signed up for an internal seminar at Strathclyde scheduled for September 2006 on hosting conferences in preparation for assisting with the planning of the proposed DLIC Dissemination roadshow events.

Please see Section 15 for a full list of dissemination activity.

⁵ European Conference on Research and Advanced Technologies for Digital Libraries www.ecdl2006.org

⁶ <http://www.csfic.ecs.soton.ac.uk/>

4. Project Management

The DIDET team has employed a temporary member of staff to work for 12 weeks during the summer period to help populate the digital library and investigate improvements to workflow. Carol Dunbar will be working with us until 1 September 2006.

At Strathclyde, Neal Juster has taken on a new role as Pro Vice-Principal of the University. He will, however, continue his involvement with the DIDET Project.

Olin College have received paperwork and are now officially part of the DIDET Project collaboration.

As previously reported, a successful request was made by Strathclyde in September 2005 to re-profile the budget.

5. Programme Support

Contact is being maintained with Steve Griffin (NSF) and with the JISC. During the reporting period Lou McGill took over from Susan Eales as JISC Programme Manager for *Digital Libraries in the Classroom* and contact is now being maintained with Lou.

Strathclyde is fully involved with the dissemination activity across all four digital libraries in the classroom projects and helped organise the meeting at Ross Priory near Glasgow on 28/29 March 2006 to progress work on this. Caroline Breslin liaises regularly with dissemination coordinators from the other 3 DLIC projects via telephone, online and in person at collaborative events.

Neal Juster met with Larry Leifer from Stanford when they presented *Design requirements for a digital library of ideas* at the JISC/CNI (Coalition for Networked Learning) Meeting: *Envisioning future challenges in networked information* on 6 July 2006.⁷ The session was chaired by Steve Griffin, NSF Programme Director.

Stanford are still in regular discussion with the SMETE team at UC Berkley and the Informedia Team at CMU.

Informal discussions continue with a wide range of design educators in the US, Europe and Japan.

6. Risk Analysis

The risk analysis submitted as part of the project plan in September 2003 remains valid. No substantial problems have occurred during the reporting period.

The project has developed a good understanding of legal issues related to its work. We continue to liaise effectively with JISC Legal⁸ for advice and confirmation of good practice where appropriate and continue to monitor developments in this area, for example by attending JISC Legal's annual conference and reading relevant publications.

Strathclyde continues to expend considerable effort in educating students of the Copyright law to prevent inappropriately scanned and copied material being used in the LLE. We have also investigated Copyright exemptions whereby copying of copyrightable material is permitted for the purposes of educational examination, see Section 10 on Intellectual Property Rights. Inclusion of

⁷ <http://www.ukoln.ac.uk/events/jisc-cni-2006/programme.html>

⁸ JISC Legal Information Service
<http://www.jisclegal.ac.uk/>

any resources in the more formal and permanent LDL remains subject to a strict information specialist approval process.

7. JORUM

DIDET currently has no plans to deposit any outputs of the project in the JORUM repository as the main output of the project is not learning and teaching materials but the infrastructure, i.e. the LauLima system which is now available from the DIDET website and the teaching and learning methodology that it enables. It could be possible to provide links from LauLima to items deposited by others in JORUM should this be of benefit to users. The progress of JORUM is being monitored by the DIDET team and contact has been made with Michael Dodds – JORUM's Outreach and Promotions Officer. We will be committed to using JORUM as a repository tool for any teaching and learning materials that may be of value to the wider higher and further education community.

8. Budgets

Strathclyde

Stanford

Olin College (NSF subcontract via Stanford University)

Section Two

9. Project Outcomes

9.1 Progress against key objectives

Progress is reported below for each key objective as proposed in the last 6 monthly report.

1. LDL Resources – Build up a sufficient number of resources to allow evaluation of the LDL to begin. These resources will include a suitable number to support Strathclyde's new level 5 class and the corresponding collaborative global design project with Stanford and Olin. Further examine and, if possible, improve existing workflow for LDL population; concentrating on the point at which resources are actually identified and submitted into LDL to ensure that this becomes embedded in existing processes and practice.

The DIDET Team at Strathclyde employed a temporary member of staff over the summer period to ensure that a sufficient number of resources was uploaded to the LDL. Carol Dunbar worked as part of the team, harvesting suitable resources from existing LLE material and uploading it to the LDL. Carol also liaised with other members of staff in DMEM to ensure that any suitable resources that they had were also submitted to the LDL. In total, over 500 items have now been submitted to the LDL to date with a significant number relevant to, or specifically for, the new Global Team Design Project.

At Stanford, a USA version of the LDL has been installed and items to be submitted have been resourced. LauLima users at all three sites will be able to browse and search both the Strathclyde and the Stanford LDLs.

With regards to the LDL workflow, this was reviewed in March 2006 to investigate possible improvements. The team convened and, as a group, went through the process of submitting and approving items. The main issue identified was that submitting items for inclusion in the LDL was a time consuming and complicated process; items viewed on a wiki page, for example an image embedded in a page, had to be found separately in the relevant file gallery in order to be submitted. Following this work, Andrew Lynn made developmental improvements to the system to improve the submission process. A new staff 'Page Option' setting was created which is only available to 'Staff', it is a 'Show/Hide' toggle setting which is set for a session. When set to 'Show', a box appears at the bottom of each page viewed which lists every file or image embedded within the page and has one checkbox for each item. The checkboxes allow the staff user to select individual items for inclusion in their personal bookmark gallery for future submission to the LDL. If an item is an image then a small thumbnail image appears alongside the name and description. Users then go to their personal 'pre-approval' gallery to view these items that have been bookmarked for LDL submission. Each user can choose to share their items with other users in the 'Staff' group. Each user can also see who has chosen to share *their* bookmarks and can import others' lists of resources. In this pre-approval gallery, resources are highlighted if they have previously been submitted to the LDL so that duplication can be avoided. Not only have the workflow improvements made the submission process easier, they also allow academic staff to work in their preferred way, that is quickly flagging useful resources during the marking process when time is scarce, i.e. 'book marking' them to return and submit to the LDL at a later time. This process also allows academics to view the whole selection made before finalising which are the best for inclusion. This new LDL workflow functionality was fully tested by Carol Dunbar when populating the LDL.

In addition to helping populate the digital library, Carol also undertook a further investigation into the LauLima workflow, examining how uploading resources to the LDL could be embedded within teaching and learning processes in the department. This work built upon the previous work by the team described above and identified roles and responsibilities relating to each stage of the process.

This is illustrated in the RACI Matrix in Figure 1, whereby relationships, accountability and responsibility for tasks and decisions relating to LauLima are summarised.

Responsible : A person involved in performing the task, makes something happen Accountable : A person who makes decisions, ensures the task is performed Consulted : A person who provides information or advice about a task Informed : A person who must be informed about a task					
	Role & Responsibility				
	LIS	Academic Staff	Teaching Assistant	Research Assistant	Student
Gather Student Submissions		R / A			C
Photograph Student Material		A	R		
Identify Material for LDL while marking	A	R			
Submit Items to Assistant	A	R	R	I	
Review candidate LDL Items & submit for approval	A	C	C	R	
Review Items in Approval Gallery	R / A	I	I	C	
Confirm or Reject Items for LDL	R / A	I	I	I	
View & Use items in LDL	A / R	R	R	R	R
Submit other items directly to LDL	A / R	R	R	R	

Figure 1: RACI Matrix for LauLima

Having identified specific roles and responsibilities, the workflow investigation indicated that a 'Research Assistant' or 'other' role would be beneficial. This could be a temporary position or the responsibilities could be given to a member of permanent staff as part of his/her workload. The issue with creating a temporary position is that it would make the 'uploading process' to the LDL restricted to a certain time of year when this position was filled. In addition, it makes the approval process a one-off intensive exercise, which may not be practical. Similarly, in knowing that the process was an annual event, individuals may be less likely to adhere to their own responsibilities at marking times as they are aware that the material would in fact not be required until a specific time of year. This raised some points to consider:

- What is the level of urgency with regards to populating the LDL? Is it satisfactory to have one year's student material available for the start of the next academic year?
- Thus, should uploading take place annually or after each semester marking deadlines?
- Is funding available for a temporary position to be made available annually?
- Are there any members of staff that may have the available time to take on the responsibilities?
- The long term sustainability of the LIS (Library/Information Specialist) Role – who will perform these tasks when the project is complete?
- Is there benefit in hiring a temporary research assistant for uploading to LDL, considering that the project will end in the next 2 years? Perhaps assigning roles and responsibilities to existing staff members now would make the project and system more sustainable.

Staff interviews were also carried out to identify other complementary or conflicting systems and processes within the department. This investigation resulted in a number of recommendations which will be taken forward by DMEM where appropriate to ensure the ongoing use of the Digital Library.

2. New level 5 class at Strathclyde – Complete development of the new level 5 class in Global Design, ready to begin at the start of the academic year in 2006. This includes the full development of the syllabus and teaching materials, as well as setting up the collaborative global design project between Strathclyde, Stanford and Olin College that is part of the class. Procedures must be in place to support the US/UK collaboration, such as system changes, weekly working plans, etc.

As detailed earlier, the new Global Design class at Strathclyde was proposed and approved the relevant teaching and learning committee in DMEM. Work to develop the class and the collaborative project has taken place by the team in conjunction with Stanford and Olin. Full details of this were reported in Section 3: Workpackage 10 – Global Team Design Project.

3. Project Website – Re-launch project website with improved template design, updated information and links to wiki pages to demonstrate some aspects of the LauLima system in practice. Updated content must also include all dissemination material to date, both for the DIDET project and for the joint Digital Libraries in the Classroom Programme dissemination that is currently underway.

The DIDET project website has been re-launched with an updated design template and all information on the web pages has been brought up to date. Please see Section 15 on Dissemination for more information on the new project website.

4. Distribute Software – Make the LauLima system software available to the worldwide community for immediate download and disseminate this information, for example using a JISC news item or OSS-Watch Service announcement. Have procedures in place to collect information on the use of LauLima so that we can report on its roll-out and continue to write up use cases and case studies for dissemination purposes.

The LauLima system and all of its components are now available for download from the DIDET website. All code was 'cleaned' prior to being made available to prevent security breaches and system components with conflicting licensing arrangements have been made available separately. Andrew Lynn liaised with the University of Strathclyde's Research and Innovation Service (formerly Research and Consultancy) who confirmed that they were happy for us to go ahead with distributing the software. We will monitor the number of downloads, however we will also monitor the user forums in order to gain an insight into how it is being used and adapted elsewhere. Caroline Breslin had previously arranged with Susan Eales for a JISC news item to be set up, this will now be followed up with Lou McGill. Caroline Breslin also discussed the possibility of distributing LauLima via the FREMA project with one of its investigators at Strathclyde.⁹ All who have registered an interest in the LauLima system have been informed that the software is now available for download.

5. Evaluation Strategy – Further develop the project evaluation strategy; continue to work collaboratively with Stanford and Olin on this and agree a way forward to aid evaluation for the remainder of the project.

The evaluation strategy was successfully reviewed at Strathclyde in conjunction with CAPLE (Centre for Academic Practice and Learning Enhancement) and subsequently agreed with Stanford and Olin. All three sites agreed a way forward for evaluation and are making plans for evaluation to

⁹ <http://www.frema.ecs.soton.ac.uk/>

be conducted during the Global Team Design Project. Please see Section 11 on Evaluation for details of this.

9.2 Project progress, development and lessons learned

As reported earlier there have been no significant changes to project plans or barriers to project progress. DIDET continues to build on strengths in learning literacies, dissemination, tools development, deployment in the classroom and evaluation. The DIDET team are successfully disseminating project information and have received several enquiries and notes of interest, both in the software and the general project methodologies and outcomes. Improvements continue to be made iteratively to the LauLima system based on staff and student user feedback. We continue to collaborate well with Stanford and Olin, and expect to learn a great deal when the new Global Design class and collaborative Global Team Design Project is implemented at the beginning of the academic year.

9.4 Objectives for Next Reporting Period

The DIDET team's key objectives for the next reporting period, September 2006 - February 2007, are listed below.

1. **Review of Distribution of LauLima**
Review the distribution of the LauLima System which is now available for download from the website. This will be done by monitoring the number of downloads, reviewing the number of system queries and also reviewing the types of queries. We will also observe the user forums that we are supporting to gain valuable feedback and will actively contribute to the user forums, for example, by asking for suggestions for future development.
2. **Evaluation of LDL Use**
Evaluate the use of the LDL now that a critical mass of resources has been achieved, including its use by USA and UK students in the new Global Team Design Project. We wish to investigate how and when students use the LDL and how effectively it supports their teaching and learning. As the LDL will continue to be populated on an ongoing basis, we also wish to gain more feedback on the actual resources within the LDL.
3. **Roll out of LDL**
We intend to roll out the LDL internally to all DMEM staff and students. We will investigate barriers to use, and potential solutions to overcome them, in order to encourage ongoing use of the system. We wish to promote the system benefits to ensure staff buy-in – encouraging the submission and re-use of resources on an ongoing basis.
4. **Global Design Class – Implement and Review**
Implement the new Global Design class at Strathclyde which includes the new Global Team Design project with student teams consisting of USA and UK students. Begin to review the class and its implementation in order to assess the feasibility of the project and class on an ongoing basis, and to review lessons learned.
5. **Continuation of Workflow Review**
Build on work done so far by the team and the work carried out by Carol Dunbar over the summer to examine the sustainability of the current workflow related to the LauLima digital library. In particular, this will focus on how the library of resources will continue to be built upon beyond the project end date and how current roles will have to evolve or be transferred to others to allow this to happen, for example, the approval process that is currently carried out by an information specialist.

10. Intellectual Property Rights

Intellectual Property Rights and Digital Rights Management remain areas where DIDET would make use of lessons learned from other DLIC projects. Information Literacy training is now embedded in relevant courses in DMEM and, as reported earlier, we have also investigated Copyright exemptions which address previous concerns about Copyright law hindering the students' design process. Although this means that students can copy material for the purposes of educational examination, for example an assessed wiki site on the LLE, we will continue to ensure that they understand Copyright issues and where exemptions do not apply. Inclusion of any resources in the more formal and permanent LDL remains subject to a strict information specialist approval process.

As before, all students who use LauLima as part of classes are asked to sign a Copyright form so that we can legally store their work in the LDL. This does not *transfer* rights to the university but gives us permission to store student-created resources for future reuse for teaching, research and other non-commercial purposes. This procedure has been cleared with the JISC Legal service. To date there have been no issues with obtaining student signatures. We will continue to use this Copyright clearance form and hope to follow the same procedure for global student teams this coming academic year.

11. Evaluation

Evaluation is an ongoing element of the project (Workpackage 12). Results of evaluation work are being regularly published (see Section 15 on Dissemination). Evaluation carried out during this reporting period is detailed below.

Evaluation at Strathclyde

Product Development Partnership (PDP)

End of class focus groups with students, using open-ended questions, sought student views on the concepts of digital libraries and the new Global Design Class. Students confirmed our thinking on items to be included in the LDL. They wanted examples of previous student work (good and bad examples with some scale of grading to indicate quality which was important to them); generic material usable across classes; recent, relevant, high quality material; and approximately 3 examples of each particular type of resource. They thought these resources could be retrievable by keywords/titles and even by year or project. The Global Design Class was well received by the students as they could see value in its use. They felt LauLima would be well suited to distributed design situations. There was also great interest in cultural issues and learning opportunities of working in global teams.

Integrating Design Project 1 (IDP 1)

A questionnaire given to 3rd year Integrating Design Project students began to explore student use of the LauLima digital library and its content. The students reporting that resources in the LDL were beneficial found that resources added insight and were useful in identifying ideas for the generation of project concepts. Examples of past student project work was the most requested information to be included in the digital library. Students wanted to know what they had to do in terms of submissions and what was expected of them in terms of quality. They also wanted to see examples of failed prototypes. Some felt that material they found hard to locate (e.g. standards) ought to also be in the digital library.

LauLima Workflow

In the last few months members of the DIDET team have been populating the LauLima Digital Library with resources for DMEM's next session's classes. Through action research; discussion and

practical use, the LauLima Digital Library workflow and related processes have developed and improved.

Evaluation Strategy

Following a dedicated meeting to review evaluation and with advice from CAPLE (Centre for Academic Practice and Learning Enhancement), Strathclyde agreed that the best way forward was to continue to use the Design Knowledge Framework to conduct project evaluation. This was agreed with both Stanford and Olin. Strathclyde then revised the original Design Knowledge Framework¹⁰ in line with the latest project developments. We intend to continue with this as a strategy for future evaluation; continuing our action research approach involving both students and staff at all institutions. (See Figure 2).

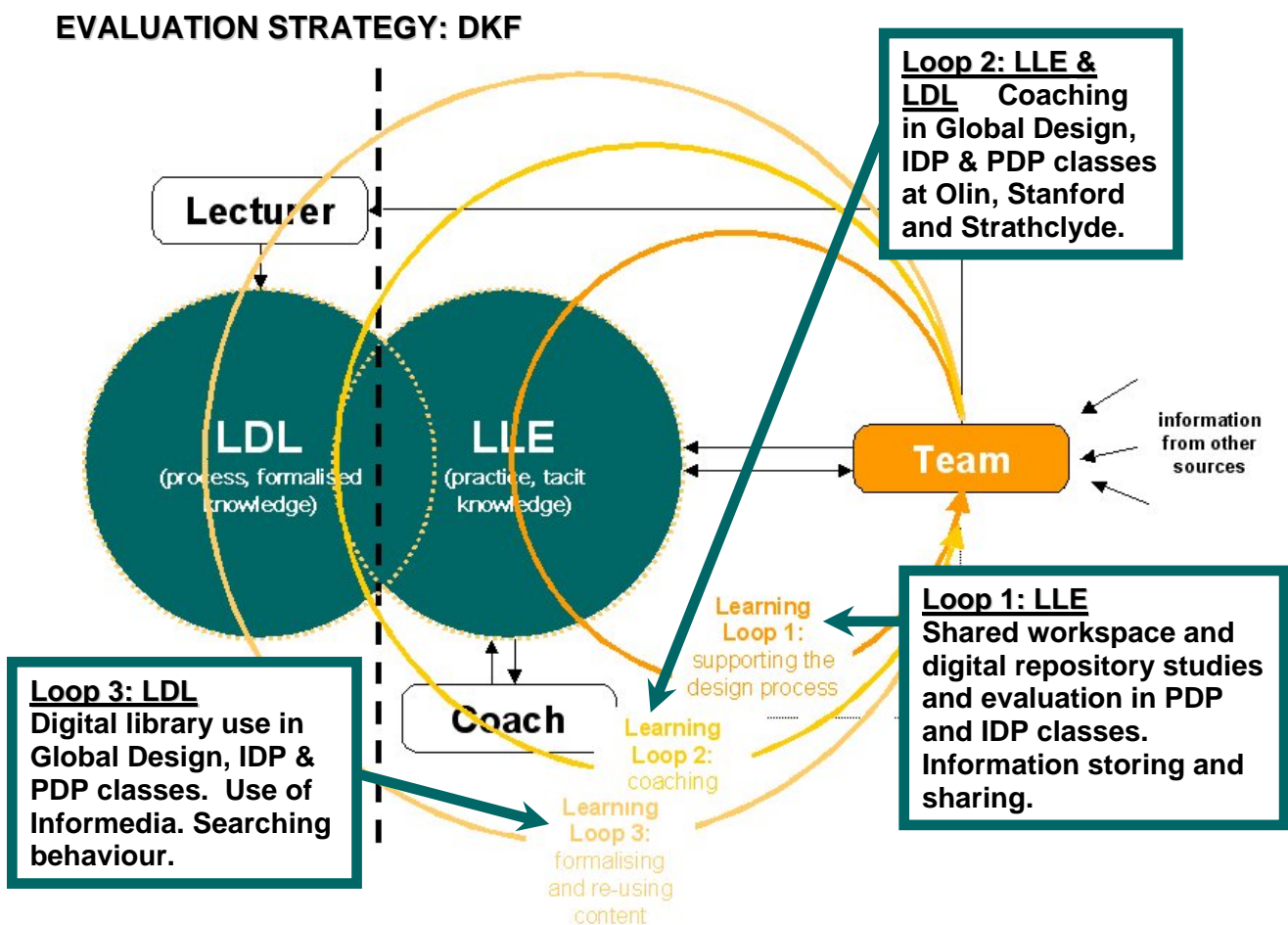


Figure 2: Revised Design Knowledge Framework (Evaluation)

¹⁰ The revised Design Knowledge Framework is soon to be published in: Breslin, C., Nicol, D., Grierson, H. and Wodehouse, A. Embedding an Integrated Learning Environment and Digital Repository: Lessons Learned. 'Embedding E-learning' workshop at ECDL - European Conference on Research on Advanced Technology for Digital Libraries. Alicante, September 17-22, 2006.

To date evaluation focus has been on the informal element of Strathclyde's LauLima Learning Environment, the shared workspace and design repository (Loop 1). Evaluation focus will now shift to examination and exploration around the more formal element of LauLima, the LauLima Digital Library; Stanford's Informedia (video digital library) and the newly designed Global Design Class and joint Global Design project (Loops 2 & 3) at the 3 institutions (Olin, Stanford and Strathclyde). Evaluation will be co-ordinated and conducted between all 3 institutions.

Future Plans

As reported above, the DIDET team has reviewed and further developed the project evaluation strategy. This entailed a review of what has been achieved to date and planning work on how evaluation will progress. There is a good opportunity with the new Global Team Design Project to gather baseline data from Stanford's existing class into which the project will be incorporated. We will then be able to compare the class before and after the new global design project has been implemented. Strathclyde, Stanford and Olin have an ongoing agenda to discuss and plan evaluation before the collaborative global design project is implemented. This evaluation planning is already being carried out as part of the preparation for the Global Team Design Project.

12. Number and level of classes involved in the project

University of Strathclyde

- (i) Integrating Design Project 1 (56314): 3rd year undergraduate student teams design a prototype for a domestic ice crushing device.
- (ii) Product Development Partnership: 4th and 5th year undergraduate student teams work to industry partner briefs through various product development stages.
- (iii) Formula Student Team: 1st to 5th year students from the departments of DMEM, Mechanical Engineering and Electrical Engineering work in a team to design, develop, build and race a car.
- (iv) Global Design (class beginning October 2006): 4th and 5th year students learn the principles of global/distributed design, related tools and methodologies and participate in a globally distributed design project to put theory into practice.

Stanford University

- (i) ME310, Tools for Team Based Design: 1st year graduate student teams work on industry sponsored design projects, producing a functional prototype, which is accompanied by text and video documentation.
- (ii) ME297, Design Theory and Methodology Forum: Graduate students investigate contemporary topics in engineering design research in a collaborative group environment.
- (iii) ME397, Design Theory and Methodology – Distributed Design with Digital Libraries: This is an experimental course for graduate students aimed at synthesizing and exercising the frameworks, knowledge, skills and attitudes of high performance distributed teams working with digital libraries

Olin College

- (i) 2260, Distributed Engineering Design (class beginning September 2006): 3rd and 4th year undergraduate students participate in a globally distributed design project. Students are first exposed to state of the art knowledge on distributed teamwork frameworks, and upon completion of the project, revisit and evaluate their efficacy.

13. Teaching staff involved with the project

University of Strathclyde

- Dougal Cameron, Martin Bell, Arthur Slight, Visiting Professors, DMEM
Industry-based design engineering experience (for PDP Class)
- Hilary Grierson – Research Fellow, Centre for Academic Practice and Learning Enhancement
Global team design, internet technologies, online learning, DMEM design coaching
- Bill Ion – Head of Department, DMEM
Product design engineering, virtual design studios
- Caroline Breslin – Project Manager, Learning Services
Information management, e-learning, DMEM design coaching
- Angela Stone – Lecturer, DMEM
Product design engineering, mechanical engineering, virtual design environments
- Avril Thomson – Lecturer, DMEM
Product design, shared workspaces, global team design
- Andrew Wodehouse – Lecturer, DMEM
Product design, gaming technologies
- Remi Zante, Alastair Conway, Ross MacLachlan – Research Staff, DMEM
Design coaching

Stanford University

- Larry Leifer, Professor for ME 310: Tools for Team Based Design.
- Mark Cutkosky, Professor for ME 310: Tools for Team Based Design.
- Ade Mabogunje, Instructor for ME 397: Design Theory and Methodology Forum
- Malte Jung, Graduate Research Assistant, Mechanical Engineering Department
- Neeraj Sonalkar, Graduate Research Assistant, Mechanical Engineering Department

Olin College

- Ozgur Eris, Assistant Professor of Mechanical Engineering and Design, Olin College

14. Collaboration between project partners

The Universities of Strathclyde and Stanford and Olin College have been collaborating effectively to develop the new Global Team Design Project which is due to begin in September 2006 at the start of the academic year. This project will be an integral part of classes at all three institutions. Strathclyde, Stanford and Olin have agreed to a weekly videoconference from now until the collaborative project has ended. This will assist planning and provide an opportunity to address any issues which may arise during the project itself.

15. Dissemination

The DIDET website is being maintained at www.didet.ac.uk. In line with our stated objectives for March - August 2006, the website was re-launched with a new design template and the content was updated to reflect the project's progress. We have published four case studies on the website to demonstrate the range of uses of the LauLima system. The dissemination pages on the website now link to world-readable LauLima wiki pages listing project dissemination activities and publications. This set up means that all of the DIDET team can update the dissemination

information at any time and also that those browsing the pages are able to see the LauLima system in use. One major addition to the website has been provision of the LauLima system for download as reported in Section 9. In addition, we have set up a DIDET-run user forum which is linked from the website where users can discuss issues and share experiences. We will also develop a 'frequently asked questions' page as they arise.

Dissemination to promote the use of the LauLima system continues both internally at Strathclyde and outwith the institution. Internally, the project was invited to speak at a Learning Enhancement Network event on *Teaching and Learning Through Technology* in March 2006. Caroline Breslin and Andrew Wodehouse gave an overview of the project, a demonstration of the LauLima system and spoke about how the system is used to support teaching and learning at Strathclyde.¹¹ Caroline Breslin, Andrew Wodehouse and Hilary Grierson then answered questions on the presentation. A note of those with further interest in the project was taken and we have contacted those interested parties now that the system is available for download.

Caroline Breslin was asked to meet with John Latham (Pro Vice-Chancellor) and Ian Marshall (Associate Pro Vice-Chancellor, Research) from Coventry University who were visiting Derek Law, Director of Information Resources at Strathclyde in May 2006. An overview of DIDET was given and also a short demonstration of LauLima and how it is used in the classroom. At this meeting it was suggested that Coventry University's Centre of Excellence in Teaching and Learning (CETL) at the School of Art and Design's would be interested in the project and its outputs. Hilary Grierson was able to follow this up when Andrew Turner and Jane Osmond from the School of Art and Design CETL visited CAPLE in June by giving them an overview of the project and a demonstration of the system.

Neal Juster and Larry Leifer received positive feedback after presenting at the JISC (Joint Information Systems Committee) and CNI (Coalition for Networked Information) 6th International Meeting in York on 6 and 7 July 2006. Their presentation was title *Presentation on the DIDET Project: Design Requirements for a Digital Library of Ideas*¹² and the session was chaired by Steve Griffin of the NSF.

The DIDET project also published an online article in D-Lib Magazine: Caroline Breslin and Ade Mabogunje. The DIDET Project - bringing digital libraries into the classroom for Design Engineering Students. *D-Lib Magazine* Vol 12 (4). April 2006.¹³

¹¹ See <http://onlinelearning.dmem.strath.ac.uk/laulima/tiki-index.php?page=PRESENTATIONS>

¹² See <http://onlinelearning.dmem.strath.ac.uk/laulima/tiki-index.php?page=PRESENTATIONS>

¹³ <http://www.dlib.org/dlib/april06/04inbrief.html#BRESLIN>

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

1. Eris, O. 'Insisting on Truth at the Expense of Conceptualization: Can Engineering Portfolios Help?' to appear in the *International Journal of Engineering Education*, 2006
2. Wodehouse A, Grierson H, Ion W, Juster N. 'Search Behaviour in a Digital Library' Submitted to Engineering and Product Design Education Conference, Salzburg, Austria, September 2006.
3. Grierson H, Wodehouse A, Ion W, Juster N. 'Project Memory to Support Global Team-Based Student Design Projects' Submitted to Engineering and Product Design Education Conference, Salzburg, Austria, September 2006.
4. Grierson H, Wodehouse A, Ion W, Juster N. 'Building a Repository to support Engineering Design Education' Submitted to Engineering and Product Design Education Conference, Salzburg, Austria, September 2006.
5. Sonalkar N, Mabogunje A, Jung M, Eris O, Wodehouse A, Grierson H, Leifer L, Lynn A, Juster N, Ion W. 'A Conceptual Framework for understanding the Impact of Digital libraries on Engineering Design Learning Performance', Submitted to ASME International Design Engineering Technical Conferences, Philadelphia, Pennsylvania, USA, September 2006.
6. Ball, P., Grierson, H., Min, J., Jackman, J., Patterson, P. Working on an assignment with people you'll never meet! Case study on learning operations management in international teams. *International Journal of Engineering Education*. Accepted 19th May 2006; expected published date of December 2006.
7. Breslin, C., Nicol, D., Grierson, H. and Wodehouse, A. Embedding an Integrated Learning Environment and Digital Repository: Lessons Learned. 'Embedding E-learning' workshop at *ECDL - European Conference on Research on Advanced Technology for Digital Libraries*. Alicante, September 17-22, 2006.

In addition to direct project dissemination, DIDET has also been used as a learning community case study for research carried out in the field of Complexity Science and has been referenced accordingly in the following papers.

- McDonald, D.M. 2006, COMMUNITY SPACE IN COMPLEX LEARNING COMMUNITIES: LESSONS LEARNT. In Proceedings of eSociety 2006 Conference, Dublin, Ireland.
- McDonald, D.M., 2006, COMPLEX LEARNING COMMUNITIES & EMERGENCE. In Proceedings of eSociety 2006 Conference, Dublin, Ireland.
- McDonald, D.M. & Kay, N., 2006. Towards an evaluation framework for complex social systems. ICCS 2006, Boston.
- McDonald, D.M., Maharg, P. & Owen, M., 2006, Embedding Innovation. ECLO Public Sector Seminar - Glasgow 14th September.

The DIDET Team plans to continue to publish findings at conferences and in journal articles in each of the key areas of design education, educational technology, information literacy, digital libraries, and systems development, with a focus on journal articles.

16. Embedding within the institution

The DIDET classroom model and the LauLima software continues to be used in classes in the Department of Design, Manufacturing and Engineering Management at the University of Strathclyde and use of the Digital Library element of the system now has much more focus. The proposed new Global Design class was accepted by DMEM's teaching and learning committee and is due to begin at the start of the academic year. There continues to be significant interest in the project at the university and two of our four published case studies are based on use of the system at the university but outwith DMEM. Andrew Wodehouse who lectures in classes using the LauLima system is now fully funded by the University of Strathclyde.