

JISC/NSF
JISC/NSF Digital Libraries in the Classroom Programme

Biannual Progress Report

Reporting Period: 1 March 2005 – 31 August 2005

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
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Confirmation Statement

I confirm that the project development is being conducted under the terms agreed in the initial contract with NSF and JISC

Section Two

1. Project Outcomes

8.1 Progress against key objectives

The key objectives for the reporting period as stated in the last 6-monthly report were:

8.1a produce learning outcomes for all elements of information literacy and incorporate these within departmental (DMEM) learning outcomes at the appropriate point

A series of separate learning outcomes have been produced for the following areas of information literacy:

Task definition

AIM - To enable students to understand the need to plan and organise a research project and define its scope and boundaries (both individually and as a member of a team)

Construct strategies

AIM – To enable students to identify and distinguish between different sources of information available and select those most appropriate to their need

Locate and access

AIM – To enable students to search for information effectively across a range of sources and access those relevant to their needs

Compare and evaluating materials

AIM To enable students to apply evaluation criteria to assess whether materials are appropriate to their need

Synthesise and create

AIM – To ensure that students are aware of a number of strategies for organising, applying and communicating information

Legal issues

AIM – To ensure that students are aware of legal issues that might impact on their research

Keeping-up-to-date

AIM – To ensure that students are aware of the range of methods and sources for keeping-up-to-date with their own and related research disciplines

Support and help

AIM – To ensure that students are aware of the range of services and support available to them, in relation to their research information needs

The learning outcomes for each area are listed in Appendix A

Whilst these learning outcomes were being developed the DMEM curriculum has been considered to identify areas most compatible with these outcomes. During the summer the department MDFs (Module Descriptor Form) underwent a process of modification (ongoing) and this was seen as an appropriate opportunity to consider how to integrate the information literacy learning outcomes.

8.1b identify which DMEM classes throughout the years would be most appropriate for embedding information literacy

Following a positive experience in the Integrated Design Project (IDP) class (reported in the previous report, Feb 2005) the literacy support and teaching has taken on a broader

perspective. The success of taking an holistic approach to learning literacies (incorporating information literacy, digital literacy, communication and team working literacies, critical literacy, and tool literacies) led the Strathclyde team to utilise this approach/model in classes incorporating project-based learning activities, thus building on the development of design project skills at appropriate points in the curriculum. As MDF's are being modified these activities are being identified and targeted for future embedding.

8.1c start to develop a framework outlining the principles, aims and structure of information literacy support throughout all years of a curriculum

Work has begun on the principles and aims of information literacy support (and is also being broadened to include the broader literacies described above). The structure will be completed following modifications to individual MDFs and will provide a framework for the department. At all stages the University Library has been involved in this process to ensure sustainability and compatibility with the University wide approach. The framework will be completed during the next reporting period.

8.1d populate the LDL with content from previous classes to test the workflow, produce written procedures and identify the extent of work required by a LIS

Members of the academic team at Strathclyde selected content as a team and utilised this activity to develop the metadata authority lists for the library. This also allowed the production of selection criteria for a variety of purposes - both potential student re-use and re-use by academic staff for future teaching. The tests revealed some cumbersome elements of the workflow within the system, particularly in relation to the amount of work required by the LIS. This led to modification of the LDL software during the summer and will be complete by the end of August. Due to this delay the written procedures will be completed in September. The simplification of the process is expected to contribute to a more sustainable system and the Strathclyde team is currently investigating the possibility of incorporating these tasks within the existing Strathclyde support system.

8.1e revise, in collaboration with the JISC Legal Information Service, student agreements, rights statements to be included as metadata in relation to rights ownership and conditions of information use/re-use. The revision will also be in the light of lessons learned in the Spoken Word Project with respect to international issues.

This work is ongoing. Discussions with the JISC Legal Service have taken place during the period and, as suggested, advice is currently been taken from the Research & Consultancy team of the University with regards to a collaborative agreement. The DIDET team at Strathclyde are also communicating with other DLIC projects to share work and experience in this area. IPR issues are also discussed in section 9. Temporary basic rights information is being recorded on the LDL and will be expanded based on work carried out by JISC Digital Rights Management Study.

8.1f specify, and begin to implement, version 3 of the DIDET system

This is described in section 3 under Work packages 7 and 8. Following the delivery of the LDL from the Centre for Digital Library Research a report was circulated to the Strathclyde team highlighting issues for future consideration, including preservation and archival issues.

8.2 Project progress and development

As described in section 1 there have been no significant changes to project plans or barriers to project progress. The project continues to build on strengths in learning literacies, dissemination, tools development, deployment in the classroom and evaluation. Representatives of several external institutions have expressed an interest in both the LauLima system and the methodologies used in the classroom. These have subject disciplines that use a similar problem based learning approach. It is hoped that the tools and methods could be tested in other disciplines and institutions before the end of the project,

which could inform future development. The recent move towards more collaborative working between the partner institutions is expected to provide significant insight to the project during the next phase of development.

8.3 Lessons learned

As mentioned in section 8.1b the team have broadened the approach to teaching support for learning literacies following a positive experience to fully integrating a range of literacies support within one class project.

Differences between the US and UK approach to data protection have become apparent, as there is no equivalent legislation in the US. UK institutions have more constraints and, subsequently, more recording mechanisms to manage and maintain. This has had an impact on decisions relating to long term storage of content on the LDL. Strathclyde has decided to strip all content of ownership to minimise the workload of data protection management. Students sign an agreement to transfer rights ownership to Strathclyde. This does raise a potential problem if a student wants to retain their rights and will need to be investigated further. It may also have an impact on the process and procedure for adding content in the US where this is not an issue.

8.4 Objectives for Next Reporting Period

During the next six months the project will:

- Investigate options to integrate and embed LauLima and other software tools to support collaborative team based project design work into the wider University of Strathclyde electronic learning environment, which includes the Pegasus Student Management system and the Web CT VLE. Contribute to the development of the University of Strathclyde's e-learning strategy and ensure that Didet activities inform and compliment the direction of the strategy.
- Offer the LLE tool to other departments within Strathclyde, Stanford and external UK institutions (possibly other DLIC projects). Ask any participating institutions to produce use case scenarios which capture the range of uses of the tool.
- Begin to develop a series of use case scenarios which illustrate how both the LLE and LDL can be used in the classroom. These will form part of the 'package' offered to other departments/institutions at the roll-out stage of the project.
- Prepare a specification for the physical design environment to incorporate a space for students to work collaboratively, capture design data and for the research team to observe and record design activities.
- Develop guidelines for class management to include curriculum, teaching team support, evaluation and the production of learning materials, with a view to developing a new level 5 class based on distributed networked support design projects for Strathclyde.
- Continue to design and implement small scale experiments between students at Stanford and Strathclyde.
- Devise guidelines and procedures for content management in the LDL. Populate the LDL with content from Strathclyde and Stanford with a view to seeing if the two institutions should use the same selection criteria, procedures, workflows, etc.

2. Intellectual Property Rights

As described in section 8.1e work is progressing in the area of IPR and DRM. Stanford and Strathclyde teams have been discussing the impact of IPR issues on the content and procedures for adding content (workflow and metadata). This has highlighted some basic differences in approach due to different legislation (see section 8.3 – lessons learned).

IPR and DRM remains an area where the JISC could offer some help in co-ordinating sharing and learning from other DLIC projects. Lou McGill has agreed with Susan Eales that she will discuss this with UK partners to prevent duplicating work. The continuing work of the JISC on DRM is proving useful in informing rights metadata development. The DIDET Project will continue to feed back any lessons learned in this area.

3. Evaluation

Evaluation is an ongoing element of the project (Work Package 12). Results of the evaluation are being published (see Section 14).

Evaluation during this reporting period focused on specific issues within identified teaching modules; e.g. global design team issues in the Manufacturing Operations Management Class, project management and reflection in the Product Development Partnership Class (Strathclyde) and the use of Informedia and SMETE (Stanford). These are detailed below.

Evaluation at Strathclyde

(i) Global design team issues in the 3rd year Manufacturing Operations Management Class:

The LauLima Learning Environment (LLE) was used to support distributed teams of UK (University of Strathclyde) and US students (Iowa State University) (139 students in total) undertaking a joint class assignment. LauLima allowed student teams to store documents, keep track of meetings and communicate across the groups.

Evaluation of the UK students involved the gathering of student feedback in a 'pyramid-structured' format in 3 stages – (i) individually students were asked to identify positive and negative experiences and give suggestions for improvement; then (ii) in groups (of 6) they were asked to share and discuss these experiences and draw up an agreed list of good and difficult aspects of team communication, information & resource sharing and team management. They were also asked to list recommendations for any difficulties. Finally (iii) discussion and elaboration in a plenary session lead by class tutors clarified the degree of consensus.

The findings provided class tutors with valuable early student-generated feedback prior to issuing the class assignment; students with an opportunity to share their online experiences and discuss solutions to any difficulties; and, the findings are being used to inform the global team working aspects of the DIDET project.

(See Evaluation Summary in Table (a) below)

Table (a): Evaluation Summary - Manufacturing Operations Management (2004-2005)	
Class parameters	139 students: 87 UK students (3 rd year UG. Manufacturing Operations Management (56305) at Design Manufacturing and Engineering Management, Strathclyde University) and 52 US students (equivalent level. Tactical Production Planning (IE 341) at Iowa State University) Worked in teams of 4 (26 'mixed' teams of 2 US & 2UK students and 9 teams of all UK students) Duration: class 11 weeks; class task 3 weeks
Class Task	Problem, objective, analysis and solution of world-wide haggis production and sales
Technology/Tools	LauLima: customised version of TikiWiki open-sourced groupware product for document storage & sharing and communications ('shout' facility, email)
Class content	Introduction to software systems and class introduction 3 phases to project Weeks 1-5 : lectures and socialisation for distributed team work (including mini tasks) Weeks 6-8 : Class task (team work) Weeks 9-11: Assessment and feedback
Teaching support	<i>Formal</i> Weeks 1-5: 1 hour weekly lecture week <i>Informal</i> Weeks 1-8: 1 hour weekly LauLima support in computer labs

Student team outputs	Collaborative report on team-generated solutions to world-wide haggis production and sales
Evaluation Methods	Pyramid session with Strathclyde students; generating feedback at 3 levels - individual, group and plenary. Time: week 6, prior to class task Purpose: reflection and sharing of experiences on LauLima system; identify issues and generate solutions to any difficulties encountered prior to class task
Findings	<ul style="list-style-type: none"> • Both 'mixed' teams and all-UK teams rated LauLima's ability to allow teams to share information most highly. • Over 60% of students working in 'mixed' teams found communication frustrating due to slow, delayed or no response to emails over the short time. • Students relied heavily on asynchronous communication. • UK students reported US students didn't seem to engage until tasks had been set. • Students in 'mixed' teams could see the benefits of socialisation and creating rules for team work prior to the class assignment.

(ii) Project management and reflection in the Product Development Partnership (56502 Product Development Project 2, 81507 Design Practice, 81423 Product Design 3):

The PDP class encourages students to take ownership and management of all parts of a design project and this year required them to use LauLima to store & share project information; manage project resources; co-ordinate project development and support team work, towards a satisfactory solution for an industry partner. For the duration of the project teams had to create a Team Site (wiki pages), a Project Log (diary/ wikis), online Minutes of meetings (word docs/wikis) and a Project File (team file galleries of project-related information and resources). In previous years these elements have been paper-based. 76 students took part in PDP this year; 40 students in 4th year (12 teams) and 36 students in 5th year (9 teams).

In addition to the tried and tested methods of evaluation (end of class questionnaire & survey and class polls on use) other evaluation techniques were deployed. LauLima's blogs were used to support learning processes within the class whilst simultaneously generating valuable feedback. Midway through the project students were encouraged to complete a Reflective Blog in LauLima by reflecting on their experiences and considering what they had learnt so far (reflection-on-action) and to plan for further learning (reflection-for-action) (Cowan, J., 1998). Negative experiences had also to be listed with suggestions as to how these could be overcome.

At the end of the class students were also asked to use LauLima's blogs to tell a story of an incident relating to professional practice that each found interesting or enlightening about working on the industry company partnership project, such as something which caused the student to re-think and/or change aspects of their working practice as a result of what was experienced. These 'stories' are to be examined and it is intended to include these experiences within the LDL for future cohorts of students to learn from along with edited clips of student interviews on the use of system.

Students continue to find LauLima a valuable tool for supporting the storing, sharing and management of resources in team projects. For more details see Evaluation Summary in Table (b) below.

Table (b): Evaluation Summary – Product Development Partnership (2004-2005)	
Class parameters	78 students (42, 4 th year and 36, 5 th year) Worked in teams of 3-4; meeting with supervisors (weekly) and industry partners/companies (as required), supported by groupware Duration: November - May
Design Brief	Unique to each team; working to industry partner briefs through various product development stages
Technology/Tools	LauLima: customised version of TikiWiki Main features – document management facilities (hierarchical file galleries and wiki pages) and

	communications tools ('shout' facility, email, blogs, forums for technical problems) Compulsory use of LauLima
Class content	Pre-project introduction to software and class with additional sessions on purpose and relevance to industry. Semester 1: conduct research and develop brief Milestone 1: initial company report Semester 2: develop concepts and select one Milestone 2: presentation/company agreement Semester 3: product development/prototyping Final presentation to company
Teaching support	<i>Formal:</i> Information literacy sessions; weekly 15mins presentations relating to class stages <i>Informal:</i> Weekly meeting with supervisors supported by access to project resources on LauLima
Student team outputs	Group Reports and Individual reports Team Wiki Sites to structure the design problem and capture the design process (Project Log) File galleries in LauLima to store, organise and share project resources (Project File) Presentations to companies Reflective blogs to reflect on and plan for learning
Evaluation Methods	Analysis of Reflective blogs during project; class polls on use; end of class questionnaire (students); interviews with selected teams and individuals; review of PDP project sites
Findings	<ul style="list-style-type: none"> • All teams used LauLima. • Information literacy sessions; suggested use of system and online technical support were of value to students. • Use of the system had to start early on in project to be most beneficial. • Students found LauLima to be most useful for the storing and sharing of project research and workflow information (in file galleries). • Teams showed a preference for maintaining Project Logs, Project Files and minutes online because of easy shared access to the information. • Few companies used LauLima. Students noted their use of LauLima would increase with company involvement. The majority of company contact was external to LauLima. • Teams reported LauLima improved project outcomes by helping teams to plan; focus on goals; keep track of progress; manage project work and teams; work faster and more efficiently (wiki pages and file galleries). • Change to working patterns - use of LauLima meant not having to meet up. • Building reflection into class was of value to the students evidenced in reports. • The team wiki sites and file galleries were of greatest value to students (for reasons listed above).

Evaluation at Stanford

Informedia based Digital Video Library usage in ME 310 during the paper bicycle design project in October 2004 was assessed through qualitative observations and surveys. The following were identified to be the motivation for using the library:

1. Clarify doubts & scepticism: Some students when in doubt about the feasibility of implementing their ideas, accessed Informedia to ascertain whether these ideas or similar ideas had been explored by teams in the past and what was the outcome of implementing them.
2. To get new ideas: Very few if any of the students went to Informedia to search for a new train of thought or to seek inspiration. The purpose of using Informedia was more towards checking up on the performance of any idea the group already had rather than looking for new ones.
3. Exploring available options: For "non critical parts" or in other words just those parts which were not critical to the functioning but were needed to make the vehicle complete, the teams accessed Informedia to discover ways in which they could make them quickly without too much effort.
4. Compare existing options: Especially with regard to choosing materials Informedia was used widely. Picking the most suitable adhesive from the plethora of available options is one example.
5. To get a general overview of the design process: Some groups started their project efforts by going through Informedia. This was done to get an idea of what all the designing of a paper vehicle would entail. It helped in setting up of time lines & identifying the CFP (Critical Function Prototype)

The following are some quotes related to Informedia usage from the survey responses of students:

- “It helped us figure out the final design for the wheels of our bike and also gave us information about what all adhesives we could use.”
- “It helped us understand the design rationale behind some of the decisions taken by earlier teams so that we could build on them. It also identified some common failure areas which we then consciously avoided.”
- “Suggestive of design solutions.”
- “Looking through the videos, gave us some tangible evidence on how things were done & what happened by doing them. It was then for us to follow their lead.”
- “Made end result better.”
- “Informedia sparked off new ideas and opened up new channels. The rationale became clear and hence it was useful.”
- “It’s a good tool for learning about past design. The one area in which it has to improve is transcription. Some of the searches resulted in garbage because Informedia wasn’t able to understand what was said in the video.”
- “Well, Informedia is a good tool. Videos seem more real than design docs, less formal & more informative.”
- “To pick the best from the past!”

Future Plans

At Strathclyde future plans include the continued observation of use of LLE in current classes and the evaluation of LDL in appropriate experiments and classes (both DMEM and joint Strathclyde and Stanford) from October 2005. Evaluation of re-use of student-generated resources is now also an identified task.

The Informedia based digital video library will be deployed again during the 2005 ME 310 Paper Bicycle design project. However, this year, the deployment will also include LauLima, and go beyond the Stanford site; student teams from the University of Strathclyde, Olin College, and the Technical University of Munich are also expected to participate and have access to the digital video library and LauLima. This will essentially be the second, and more advanced, phase of the Strathclyde-Stanford experiment carried out in May 2005.

4. Number and level of classes involved in the project

Strathclyde University

- (i) Integrating Design Project 1 (56314): 3rd year undergraduate student teams prototype a domestic ice crushing device.
- (ii) Product Development Partnership: 4th & 5th year undergraduate student teams work to industry partner briefs through various product development stages.
- (iii) Manufacturing Operations Management Class Assignment (56305): 3rd year Strathclyde University undergraduate students and Iowa State University students work in teams to solve world-wide haggis production and sales.
- (iv) Formula Student Team: 1st to 5th year students from mechanical engineering, electrical engineering and DMEM work in a team to design, develop, build and race a car. (Year 2005/6 2 teams will be formed, junior and senior).

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.

5. Teaching staff involved with the project

Strathclyde

- Peter Ball, Senior lecturer: Operations management; DMEM
- Dougal Cameron, Martin Bell, Arthur Slight, Visiting Professors for PDP class: Industry-based design engineering experience
- Hilary Grierson, Research fellow and Design studio tutor: Global team design/Internet technologies; Online learning; Centre for Academic Practice & Learning Enhancement
- Bill Ion, Head of Department: Product design engineering/Virtual design studios; DMEM
- Lou McGill, Learning technologist: Learning literacies
- Angela Stone, Lecturer: Product design engineering/Mechanical engineering/Virtual design environments; DMEM
- Avril Thomson, Lecturer: Product design/Shared workspaces/Global team design; DMEM
- Andrew Wodehouse, Lecturer: Product design/Gaming technologies; DMEM

Stanford

- Larry Leifer, Professor for ME 310: Tools for Team Based Design.
- Mark Cutcosky, Professor for ME 310: Tools for Team Based Design.
- Ozgur Eris, Instructor for ME 272: Design Theory and Methodology Forum.
- Ade Mabogunje, Instructor for ME 272: Design Theory and Methodology Forum

6. Learner Collaboration

The Manufacturing Operations Management Class made good use of familiarisation and socialisation techniques to build trust and develop collaboration amongst distributed teams at Strathclyde and Iowa. To 'kick-off' the class assignment students had to acquaint themselves with team members by creating and uploading images and descriptions of themselves, their interests and academic strengths to the LLE file galleries for others to view and share. This has been shown to be an important element to global design team working and the use of LauLima.

Further 'mini' collaborative experiments are being currently planned to achieve collaboration between students at Stanford and Strathclyde Universities in order to determine whether in terms of learner collaboration a global design course (module) is appropriate or whether it would be better to include global design projects as assignment tasks in existing modules at both institutions.

7. Dissemination

The project website is live at: <http://dmem1.ds.strath.ac.uk/DIDET/>

Workshops/Presentations

- 1 McGill, L & Lynn, A. 'The DIDET Project', Presentation to CETIS Metadata Workshop, Edinburgh, March 2005
- 2 McGill, L. 'Guerrillas in the midst: enhancing student learning through a multidisciplinary team approach' Presentation at the *Innovative Practice* strand of the JISC Programmes Meeting, Homerton College, Cambridge July 2005
- 3 McGill, L & Littlejohn, A. 'Approaches to designing informal learning activities for problem based learning', Presentation and workshop at *Designing blended learning activities* Supporting Sustainable eLearning Forum (HEA), University of Southampton, 2005 July 21st

The following papers have been written and published/presented:

1. Eris, O; Mabogunje, A; Leifer, L; Jung, M; Khandelwal, S; Neeley, L; Hutterer, P; Hessling, T; 'An Exploration of Design Information Capture and Reuse in Text and Video Media' in *Proceedings of the International Conference on Engineering Design*, Melbourne, August 2005.
2. McGill, L. & Littlejohn, A. 'Using knowledge structures to enhance reflective practice', *Reflective learning, future thinking: ALT Spring conference and research seminar* March 2005
3. MacGregor, G. & McGill, L. 'Digital Libraries and Information Literacy Issues within Virtual Learning Environments: An e-Learning Impasse?', *LILAC 2005: Librarians' Information Literacy Annual Conference*. April 2005
4. McGill, L., Durkin, C & Littlejohn, A. 'Not just the usual suspects: a strategic approach to developing literacies for learning in the higher education community', *Elit 2005: eLiteracy and eLearning 4th International Conference on eLiteracy*, June 2005
5. Wodehouse A; Grierson H; Ion W; Juster N; McGill L; 'Enhancing design learning using a digital repository' *Proceedings of International Conference on Engineering Design (ICED05)*, Melbourne, Australia, August 2005. ISBN 0-85825-788-2
6. McDonald, D. & McGill, L. 'The Emergence of eLiteracy: enhancing our understanding', *Elit 2005: eLiteracy and eLearning 4th International Conference on eLiteracy*, June 2005
7. McGill, L., Nicol, D.J., Littlejohn, A., Grierson, H.J., Juster, N and Ion, W.J. 'Creating an information rich learning environment to enhance design student learning: challenges and approaches'. *British Journal of Educational Technology*, vol 367, No 4, pp 629-641, 2005

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

8. Eris, O., "Insisting on Truth at the Expense of Conceptualization: Can Engineering Portfolios Help?" to appear in the *International Journal of Engineering Education*, 2005.
9. Grierson, H., Wodehouse, A., Ion, W.J., Juster, N., 'Supporting Reflection and Problem-based Learning through the use of LauLima', *3rd Engineering and Product Design Education International Conference*, Edinburgh, September 2005.

Plans are to continue publishing 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. In particular the project aims to produce at least two good journal papers a year.

References

Cowan, J., 1998, *On becoming an innovative university teacher: reflection in action*. London: SRHE & Open University Press.

Appendix A - Information Literacy Learning Outcomes

To improve information literacy by teaching essential concepts and research skills relevant to a design engineering course or project, which are transferable and appropriate for future learning.

These learning outcomes are based on a merging of two internationally accepted models for information literacy – the US Big Six Model and the UK Seven pillars model. Both models cover the same basic elements of information literacy but the terminology is sometimes different. Terminology has been selected from both models so as to reflect terminology used in design education. It is hoped that this would make the learning outcomes more acceptable to design engineers and would make their integration within the curriculum easier.

Each set of outcomes could be defined by expected level of competence (ie novice 1st year to fully proficient 5th year). These levels should be identified in the framework illustrating the integration and embedding within the curriculum. Some outcomes may only be relevant at more advanced stages of competency.

Task definition

AIM - To enable students to understand the need to plan and organise a research project and define its scope and boundaries (both individually and as a member of a team)

OUTCOMES – Students will:

- 1 be able to describe the varied elements of the research process and the level of organisation required to complete the project
- 2 be able to visually represent the central and related concepts which impact on their research, and relationships between these
- 3 be able to examine these concepts, distinguish initial areas of investigation and formulate a research plan
- 4 be able to identify different methods for limiting or broadening a research project
- 5 translate their research question into relevant keywords and phrases
- 6 be able to discuss the need to evaluate and periodically revise the research plan

Construct strategies

AIM – To enable students to identify and distinguish between different sources of information available and select those most appropriate to their need

OUTCOMES – Students will:

- 1 be able to define different categories of information, e.g. theoretical, statistical, product related, and assess the relevance to a research project
- 2 be able to define different publication types, e.g. standards, journals, newspapers, and identify which categories of information they contain
- 3 be able to recall the range of options, e.g. library catalogues, indexes and abstracts, for finding different publication types
- 4 be able to recall how to obtain the appropriate password for any electronic source

Locate and access

AIM – To enable students to search for information effectively across a range of sources and access those relevant to their needs

OUTCOMES – Students will:

- 1 be able to translate their information needs, identified during the planning stage, and construct an initial search strategy
- 2 be able to apply different search techniques, e.g. phrase searching, Boolean operators, truncation, wildcards, controlled vocabulary
- 3 be able to adjust the search strategy as appropriate for different sources
- 4 be able to evaluate their search strategy, based on a critical assessment of results, during the searching process to adapt and improve the search
- 5 be able to identify the range of options available to them for obtaining material, e.g. book loans, electronic journal articles, visiting other libraries,

Compare and evaluating materials

AIM To enable students to apply evaluation criteria to assess whether materials are appropriate to their need

OUTCOMES – Students will:

- 1 be able to describe various criteria and methods for appraising the validity of materials
- 2 be able to apply the criteria to judge whether materials are appropriate to their research need

Synthesise and create

AIM – To ensure that students are aware of a number of strategies for organising, applying and communicating information

OUTCOMES – Students will:

- 1 be able to distinguish between the different types of information that they collect during their research, e.g. bibliographic references, journal articles, datasets, notes, correspondence
- 2 be able to engage (and re-engage) with information at the appropriate time and extract relevant content to support the research project
- 3 be able to explain the need to formulate appropriate systems to manage this information, e.g. shared workspaces, bibliographic software, index cards, electronic or manual filing systems
- 4 be able to organise this information in a way that reflects the original visual representation of the concept definition and task boundaries and relationships
- 5 be able to differentiate between the advantages of each different method of outputting search results, e.g. print, e-mail, saving to disk
- 6 be able to apply the outputting method most appropriate to their own (or team mates) needs
- 7 be able to store, organise and present their own content and synthesise this clearly with other externally sourced information (either within written work, electronic learning environments or presentations)
- 8 be able to recognise that existing content can be combined with original thought and analysis to produce new information or knowledge

Legal issues

AIM – To ensure that students are aware of legal issues that might impact on their research

OUTCOMES – Students will:

- 1 be able to describe the key Copyright Law issues affecting information retrieval and production
- 2 be able to explain the need for accurate referencing and citing
- 3 be able to recall where they can obtain information and support on using the most appropriate referencing or citation style
- 4 ensure that text, data and images are obtained, stored and disseminated legally

5 be able to describe ways of avoiding plagiarism

Keeping-up-to-date

AIM – To ensure that students are aware of the range of methods and sources for keeping-up-to-date with their own and related research disciplines

OUTCOMES – Students will:

- 1 be able to identify the range of methods and sources for keeping-up-to-date with their own and related research disciplines, e.g. alerting services, e-mail discussion lists

Support and help

AIM – To ensure that students are aware of the range of services and support available to them, in relation to their research information needs

OUTCOMES – Students will:

- 1 be able to locate information about accessing the range of services and support in relation to their research needs