Designing and Sharing Inquiry-based Learning Activities: A LAMS Evaluation Case Study

Final Report

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Executive Summary

1. This report presents the findings of an evaluation project funded by the Joint Information Systems Committee (JISC) as part of its Design for Learning programme.

2. The project was entitled *Designing and Sharing Inquiry-based Learning Activities* (DeSILA) and ran from May 2006 to October 2007.

3. The project assessed the effectiveness and impact of the Learning Activity Management System (LAMS) at the University of Sheffield in relation to: acceptability to practitioners; learner outcomes; effectiveness for the organisation; capacity-building across the organisation.

4. The main research question was: to what extent does a tool such as LAMS add value to the practice and impact of designing for inquiry-based learning (IBL), and to the dissemination of IBL pedagogy?

5. Key findings were:

- LAMS was useful in bringing the concept of design for learning to the fore at institutional and individual levels and in supporting the practice of process-aware design for IBL.

- LAMS (in the version tested, i.e. version 1) offered a good fit with some practitioners' pedagogical purposes and values in relation to IBL. It was seen to provide well for the design of linear forms of inquiry and relatively tightly-structured, teacher-controlled pedagogy.

- It appeared considerably less well-suited to the design of more flexible and open-ended forms of inquiry and despite its orientation towards activity it did not tend to direct pedagogical thinking and practice towards student-led pedagogy.

- The ease with which activity-design is supported by LAMS was perceived as bringing a risk of unreflective, mechanistic approaches to design.

- The important role for pedagogical guidance and for opportunities for practitioner reflection and dialogue in supporting design for IBL, when a design system such as LAMS is being used, was confirmed.

- Practitioners often wanted to use LAMS in conjunction with the institution's VLE, but there was limited opportunity to do this during the project because of interoperability constraints.

- LAMS was experienced as relatively easy to use. Institutional commitment to supporting the system was identified as critical to practitioner willingness to invest time in developing LAMS-based designs.

- Staff satisfaction with LAMS was mixed. Practitioners were enthusiastic about the capacity to guide students through structured, relatively linear sequences of inquiry activity, and welcomed LAMS as more effective than the institutional VLE in this respect. Pilot users were in general satisfied with impact on the student experience. However, practitioners perceived LAMS as unsuited to supporting design for more open-ended, independent forms of

student inquiry and some questioned its 'added value' in relation to the institutional VLE for orchestration of student learning.

- Students' responses to using LAMS were mixed but there were clear indications of positive engagement and beneficial impact on learning experiences. Negative responses often related to limitations on the ability to independently move freely back and forward through a sequence.

- Introductory workshops followed by opportunities for one-to-one educational development support were welcomed. A need was identified for a pedagogical planning resource to support IBL uses of LAMS, and for case study presentations of LAMS implementations by other practitioner-users.

- The project demonstrated that systems integration with the institution's VLE would be essential to practitioner acceptance of LAMS beyond the pilot.

- It also suggested that most practitioners would be unlikely to look beyond the institution for technical support if the system were to be rolled out in the longer term, making provision of in-house 'help-desk' style support (supplemented by in-classroom support where needed) essential.

- LAMS proved amenable to a range of approaches to design, including reuse of previously authored sequences. However, cultural and other factors appeared to constrain the practice of reuse, and the project confirmed the need for local, community-focused strategies to encourage development of active sharing and reuse practices.

- Practitioners' attitudes to reuse suggested that they might be more open to reusing whole-sequence LAMS-based activity designs when the content is perceived as generic and therefore also directly transferable.

- Practitioners responded positively to the prospect of using LAMS to 'cherry-pick' design ideas (components of whole sequences) for adaptation to their own needs.

- The project findings suggest that practitioners may be more likely to use local rather than remote repositories of LAMS-based designs.

- There was some indication that repositories of LAMS-based designs should be as closely integrated as possible with other practice-sharing platforms in the context of community-focused development and innovation for IBL, so that practitioners have a 'one-stop' interface to exploring and sharing different pedagogical resources and tools.

- The project suggested the value of 'decoupled' design and orchestration functionality in design for learning tools, and of future exploration of requirements for tools for students as (co)designers of their own learning.

6. Main project deliverables were: a report on the impact of using LAMS in design for IBL; recommendations for effective embedding and use of LAMS for IBL, as regards implications for: academic practice; educational development and support; technical support; institutional policy and strategy; development of learning design systems; a portfolio of LAMS-based IBL designs, embedded into case studies.

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1. Introduction

This report presents the findings of an evaluation project funded by the Joint Information Systems Committee (JISC) of the Higher Education Funding Council for England as part of its Design for Learning programme. The project, entitled *DeSILA: Designing and Sharing Inquiry-based Learning Activities,* was based at the University of Sheffield and ran from May 2006 to October 2007. It was carried out by a Centre for Excellence in Teaching and Learning - the Centre for Inquiry-based Learning in the Arts and Social Sciences (CILASS) - in collaboration with the University's Learning and Teaching Services (LeTS).

1.1 Background and rationale

The project was motivated by an interest in exploring issues to do with 'design for learning' in the context of inquiry-based learning (IBL), and focused specifically on the role and impact of the Learning Activity Management System (LAMS), a design for learning tool, in supporting and developing IBL practice. User evaluation of LAMS was carried out with the broader purpose of exploring 'proof of concept' in relation to technology-mediated design for learning in a specific pedagogical and institutional context. The over-arching research question therefore was formulated as: to what extent does a tool *such as LAMS* add value to the practice and impact of designing for IBL, and to the dissemination of IBL pedagogy?

Using a primarily qualitative research/evaluation methodology, the project set out to investigate the role and value of LAMS for creating, orchestrating and sharing/reusing designs for IBL in a real-life, institutional 'case study' context of development and innovation in blended and fully on-line forms of IBL. It was underpinned by an understanding of design for learning as situated action; that is, as influenced by the beliefs and values held by designers in specific contexts of practice.

1.2 Design for learning

Design for learning has been defined by JISC as *"the process of designing, planning and orchestrating learning activities"* (JISC, 2006). This definition foregrounds the role of activity design and facilitation in pedagogical practice and is underpinned by a broadly constructivist position on learning, in which active learner engagement is understood to be central to the educational process. Interest in the part that digital technologies may play in facilitating design for learning reflects a relatively recent shift of emphasis in the e-learning research and development context from a primary focus on digital content creation towards increasing interest in the use of digital tools and environments to support the design, sequencing, orchestration, sharing and reuse of learning activities.

A more recent definition of design for learning as *"the process by which teachers - and others involved in the support of learning - arrive at a plan or a structure or design for a learning situation"* (Beetham and Sharpe, 2007: 6) appears somewhat less encompassing than the JISC definition quoted above, in excluding the element of orchestration - although by implication allowing for the emergent and responsive nature of design processes as they may occur during, as well as prior to,

orchestration. This definition also reflects the strong emphasis, thus far, in research and development for design for learning, on the concept of 'teacher as designer'. However, a role for the 'learner as designer' can also be envisaged, and developments in the use of Web 2.0 tools for learning and teaching in HE are seen to offer promise in this respect, in terms of positioning *"empowered individual learners at the centre of the e-learning design process"* (Mayes and de Freitas, 2007).

1.3 LAMS

LAMS is an open source tool that was developed at Macquarie University, Australia, by James Dalziel. It has rapidly become the world's leading design for learning software and integrations are available with a number of other systems, including virtual learning environments (VLEs) such as Blackboard and Moodle. An organisation that provides a range of services built around the software, including technical support and external server hosting, is by now well-established (www.lamsinternational.com) and a LAMS Community website offers a platform for a wide range of discussion forums and a repository of shared LAMS design sequences (www.lamscommunity.org). A sister tool, the Research Activity Management System (RAMS), is in development and is intended to support collaborative research activity.

Created specifically to enable design, orchestration and sharing/reuse of sequences of learning activity, and placing special emphasis on supporting collaborative and group processes, LAMS can be used in classroom-based or distance learning, either on its own or in conjunction with other tools and environments. Its visual, drag-and-drop design interface offers a range of activity types combined with the means to arrange these into sequences and connect associated content. For example, a sequence might start with small group discussion, followed by web research and resource-sharing, followed by large-group discussion of the results in relation to material provided by the teacher, ending with individual reflection and note-making. LAMS offers tools that provide these activity types, and a growing range of others.

LAMS does not represent an entirely novel toolkit, in that much of what it offers - for example, bulletin boards, synchronous 'chat' and survey/quiz tools - is also available in many VLEs. However, VLEs have been subject to critique on the grounds that they more readily support content-delivery than activity-oriented pedagogies (e.g. Britain, 2004). They do not enable easy visualisation of linked steps in a learning process (Vogel and Oliver, 2006) or support sharing of 'runnable' designs. LAMS is intended to encourage activity-oriented design thinking and support such visualisation and sharing/reuse.

Dalziel (2007a) identifies 'pedagogic neutrality' as a key driver for design for learning systems in general and LAMS in particular, with the aim of developing software platforms that are sufficiently flexible to support a wide range of pedagogical approaches. This characteristic distinguishes general design for learning tools such as LAMS with others that support specific pedagogical approaches, such as the scenario-based tool, SBLi, which has been developed at Queensland University with the aim of support problem-based learning (PBL) (www.sblinteractive.org).

Version 2 of LAMS was released in December 2006 and further development of the software is ongoing. In response to feedback from users of Version 1, development is currently oriented towards embedding greater flexibility into design structures and promoting the tool as a general means of planning learning activities, whether these are to be run on-line or off-line, within LAMS as a closed system or outside of it within

a different system. Recent and upcoming features include: sequencing options that are not as linear as those in Version 1, including a range of 'branching' and options that allow students to pursue different routes within an overall sequence and carry out different activities; the capacity to use information from completed activities to determine subsequent paths or tasks; the ability to designate all activities to run either on-line or off-line. A further line of development for LAMS is the provision of tools for creating and sharing templates for integrated 'pedagogic planners'. These would be created by experts and designed as pre-configured, good practice templates illustrating different 'generic' sequences of learning activity classified according to teaching style. They would offer users the possibility of selecting a sequence-template to populate with their own content or adapt as desired.

A growing but still small body of LAMS research and evaluation data relating to higher education (HE) implementations became available during the lifecycle of the DeSILA project (notably, via the proceedings of the First and Second International LAMS Conferences, available at http://lamsfoundation.org/lams2006/ and http://lams2007sydney.lamsfoundation.org/). Some early evaluations in HE elicited mixed responses (e.g. Masterman and Lee, 2005) but many positive outcomes in terms of orienting practitioners' design thinking in activity-focused directions and providing design inspiration, have been reported (e.g. Dalziel, 2007b). It appears that, thus far, LAMS has mainly been used to support practitioner-led design (that is, design by academic and learner support staff) but communications on the LAMS Community website indicate that it has begun to be seen and experimented with as a tool for use by students as designers. Dalziel (2007a) suggests that LAMS offers the following benefits for IBL: the ability to offer different levels of scaffolding for inquiry activities, including moving progressively from well-defined to less-defined tasks; the ability to structure collaborative inquiry activities around pre-identified content or information search tasks; the potential for sharing and adaptation of 'generic' inquiry designs by means of pedagogic planner templates.

The DeSILA project did not set out to focus mainly on gathering feedback about specific features of a tool that is evolving. Although it was anticipated that the DeSILA project would have the opportunity to evaluate practitioners' use of Version 2 it ultimately focused on Version 1, which was superseded during the project's lifetime. However, the project was less interested in evaluating the features of a specific version of LAMS than in more general issues raised by such a tool for the development of practice and tools for design for IBL in our disciplinary and institutional context, and by extension, other HE contexts. Aspects of LAMS Version 1 functionality - such as the ability to easily orchestrate sequences of online information-gathering, sharing and discussion - appeared to offer promise in relation to IBL.

We saw creative, activity-conscious design thinking as a key to further developing IBL, and wanted to explore its use in our environment, including in conjunction with the University's VLE. We also anticipated potential use of LAMS for the design for information literacy development activities intended to support IBL. We envisaged a variety of modes of engagement with LAMS, including its use for distance learning and blended, classroom-based activity, and for both small-scale and more extended, whole-module sequences. It was also possible that practitioners might choose to use LAMS to design activity sequences intended to be run in off-line, face-to-face settings or using the VLE or other technologies.

CILASS has a strong interest in the sharing and reuse of IBL expertise. We therefore wished to investigate the value of LAMS-based learning designs as sharable and reusable resources for the IBL community at institutional level and more broadly within and beyond the CETL context. This offered an opportunity not only to evaluate

the specific features of LAMS for sharing and reuse but to explore broader issues relating to the requirements for effective reuse from a practitioner perspective.

1.4 Inquiry-based learning

IBL is an approach to active learning in which open-ended, student exploration, investigation or research drives the learning experience, and all learning and teaching resources and activities are designed to support the inquiry process. With theoretical roots in constructivist and socio-cultural models of learning, it is advocated as an approach that engages students explicitly with the processes of knowledge creation and co-creation (e.g. Spronken-Smith et al, 2007) and is regarded as a key pedagogy in strengthening the links between teaching and research in HE. Discipline- or practitioner-based approaches to research and scholarship are modelled in the students' experience, based on structured or more flexible inquiry tasks that may be small or large in scale; these include problem or case scenarios, field-work investigations, experiential learning projects, and research projects of different kinds. Students often work collaboratively and use digital technologies to interact with peers and tutors, access information, and produce and share outputs. IBL may provide the design principle for whole courses or even programmes. Alternatively, IBL activities can be incorporated into specific learning events in more traditional curricula.

PBL is a close cousin of IBL, and some forms of IBL draw on PBL protocols to structure the students' experience. While multiple approaches to PBL exist, IBL approaches are still more diverse and often tend to offer students greater freedom and flexibility than PBL in directing the process of their learning. As emphasised by Hutchings (2007), the fundamental element of all IBL is *the question*, whether established by students, teachers, or by negotiation amongst them. IBL is grounded in principles and values associated with student ownership of, autonomy in, and responsibility for, the learning experience. In the light of this, students may be offered choice in the questions they pursue and in determining how to pursue them. Sometimes arising out of a pre-established case or problem scenario, inquiry questions provide the point of departure for student learning through an emergent process of exploration and discovery, with guidance from the teacher working in a facilitative role. Often, the questions will be open-ended, to which differing responses - rather than one correct answer - may be valid. While some forms of IBL focus on questions to which answers already exist, IBL is often conceived as a means of engaging students with the contested nature of knowledge and with 'messy', open-ended problems and lines of inquiry that are authentic and important to the discipline, or that emerge in interdisciplinary contexts. IBL is seen as a pedagogy that equips students to develop 'inquiring' dispositions and capabilities perceived to be of particular relevance to life and work in a highly complex and challenging world, and as an approach that brings students and teachers into closer relation with each other around a shared practice (e.g. Brew, 2006).

Pedagogical strategies range from more directed, teacher-led approaches, in which the teacher may set the questions and offer a great deal of guidance and support on approaching the inquiry process, to more flexible, student-led approaches in which students have a significant degree of control and ownership in developing their own questions and activities. It has been argued that,

> the truest, most radical and empowering forms of enquiry-based learning are those which endow students with the challenge, freedom and responsibility of

> determining all - or at least as much as is possible - of their learning within the field […] such enquiry-based learning is closest to replicating genuine research and is its ultimate power as a learning method (Hutchings, 2007: 19-20).

Some IBL approaches are designed principally to facilitate students' exploration of the existing knowledge-base of their discipline, while others more explicitly invite their participation in building disciplinary knowledge. Levy and Petrulis (2007) have characterised these two approaches as 'information-oriented' IBL and 'discovery-oriented' IBL respectively, and identify two broadly contrasting variants of each, according to the extent to which they are 'teacher-led' or 'student-led':

- *'Information-responsive' inquiry, framed by teachers:* Students explore the knowledge-base of the discipline in response to questions, problems, scenarios or lines of inquiry formulated by staff ("what is the existing answer to this question?")

- *'Information-active' inquiry, framed by students: S*tudents explore the knowledge-base of the discipline by pursuing questions, problems, scenarios or lines of inquiry that they themselves have formulated ("what is the existing answer to my question?")

- *'Discovery-responsive' inquiry, framed by teachers: S*tudents pursue new questions, problems, scenarios or lines of inquiry, as formulated by tutors, in interaction with the knowledge-base of the discipline ("how can I answer this new question?")

- *'Discovery-active' inquiry, framed by students:* Students pursue their own new questions, problems, scenarios or lines of inquiry, in interaction with the knowledge-base of the discipline ("how can I answer my question?")

In the course of a given inquiry, the dynamic of students' activity may well encompass both the exploration of existing knowledge (finding out about existing theory, perspectives and so on) *and* building upon this in ways that potentially create new knowledge for the discipline. In an extended inquiry process, students may move from a more teacher-led experience initially to a more strongly student-led one at later stages. At the level of whole curricula, there is likely to be progression from more strongly teacher-led and tightly-scaffolded forms of IBL at earlier levels of academic study towards more independent forms at more advanced levels.

'Process support' activities and resources that aim to develop students' capabilities in areas of relevance to the inquiry process are often embedded into designs for IBL. These may focus on the development of discipline-specific inquiry methodologies and techniques, as well as 'transferable' skills in areas such as information literacy or collaborative work. Strategies to encourage student reflection on process also may be adopted, with the aim of facilitating the development of meta-cognitive and other skills associated with learning to learn.

It will be apparent from this brief overview that there is no single design protocol for IBL. However, the following broad elements of the inquiry process typically are accounted for in a design:

- Students and/or tutors establishing an inquiry task;
- Students pursuing lines of inquiry (often in groups);

- Students drawing on their existing knowledge, and identifying new learning and information needs;
- Students seeking information and evidence from multiple sources;
- Students discussing, receiving guidance and feedback, and synthesising information;
- Students reflecting, analysing and communicating ideas and results;
- Students working with peers and teachers as partners, or participating in an inquiry community.

IBL practitioners draw on design principles derived from constructivist perspectives on learning; in some cases these are more oriented towards cognitivist perspectives and in others towards more social/situative perspectives. At the University of Sheffield, academic staff are supported by CILASS to approach design for IBL in terms of a number of distinctive features, including: situating the inquiry task at the centre of the students' experience; identifying a task that requires student engagement with authentic inquiry practices of their discipline; providing for 'process support' in areas such as information literacy development as well as discipline-based methodologies and techniques; providing activity-sequencing that is appropriate to an emergent process of discovery. Whereas an instructivist pedagogical approach might, as its point of departure, offer a unit of theoretical content to which students are asked to respond, an IBL approach would be more likely to start out with an open question or scenario, or a reflection or discussion activity. CILASS uses the 'hub and spokes' representation reproduced in Figure 1 to reinforce the centrality of the inquiry task in design for IBL.

Figure 1: Design elements for IBL

1.5 Institutional context

The University of Sheffield has a strong strategic commitment to IBL, as articulated in its Learning, Teaching and Assessment Strategy, 2005-2010. CILASS plays a key role at institutional level in promoting and developing IBL, within the arts and social

sciences and beyond to all disciplines in the University. The CETL promotes IBL approaches that facilitate student collaboration and participation in communities of inquiry, creative use of digital technologies, and explicit embedding of information literacy development within IBL activities. Capital funding received by the CETL has been used to create new learning spaces ('inquiry collaboratories') that are purpose-designed to facilitate flexible forms of technology-enhanced group-working using collaborative workstations, interactive whiteboards, videoconferencing and mobile computing.

The University's VLE is central to its strategy for continued enhancement of the student learning experience. It adopted WebCT in November 1998 as its centrally-supported VLE, and upgraded to WebCT Vista on an institution-wide basis in September 2005. The University now runs *Blackboard Academic Enterprise - Vista Environment*, renamed locally My Online Learning Environment (MOLE). All academic departments use MOLE to some degree, and some have unilaterally decided to support all taught modules via MOLE. There are more than 2,500 MOLE registered designers/instructors/teaching assistants, more than 1800 live or active modules and, during 2006-7, more than 20,000 individual users accessed the system as part of teaching and learning activity. There is full integration with the institution's student record system, user authentication system, library systems, plagiarism checker, and Blackboard Scholar. There is also an integrated e-portfolio solution that is available to all users of the system and pilots of other software integrations are ongoing. A centralised MOLE helpdesk runs as part of the wider Corporate Information and Computing Services Helpdesk system. Key issues currently facing the institution in relation to e-learning include: continuing growth in VLE usage, including in arts and social sciences disciplines; management of user (staff and student) expectations; increasing complexity of technologies, both to the user and to central support; differing support needs of stakeholder groups, with 'early adopters' and 'early majority' practitioners having different perspectives and needs. The mission criticality of the system requires formalisation of risk management procedures.

Other features of the institutional context of learning and teaching development that were of particular relevance to the DeSILA project at its outset included:

- Relatively limited sharing and reuse of designs for inquiry-based learning. The CETL was at a relatively early stage in the process of generating, though its funded development initiatives, sharable representations of IBL, and at an early stage in developing a conceptual framework for sharing and reuse;

- Relatively limited local, context-specific knowledge of how academic staff conceptualise the use of digital technologies in IBL and how they design for IBL using digital technologies or other tools, and of their motivations and likely requirements for sharing and reuse;

- Relatively little strategic engagement with, or operational support for, open source learning technologies at institutional level,

1.6 Research questions

The project assessed the effectiveness and impact of LAMS in relation to the broad areas of: acceptability to practitioners; learner outcomes; effectiveness for the organisation; capacity-building across the organisation. User evaluation was carried out from the perspective of academic staff, students and educational developers.

As noted above, the over-arching research question explored was:

- To what extent does a tool such as LAMS add value to the practice and impact of designing for IBL, and to the dissemination of IBL pedagogy?

Further, specific questions were as follows:

- To what extent do the features and functionality of LAMS fit with practitioners' purposes and values in designing for IBL, and with their approaches to the design process?
- What are the characteristic ways in which practitioners use LAMS in IBL design, including in conjunction with other online tools? How do their pedagogical beliefs and values impact on their use of the tool?
- What does LAMS contribute to the development of effective practice in designing for IBL, in relation to both design-from-scratch and reuse?
- Are the demands made on practitioners' time, resources and competences acceptable?
- Does the use of LAMS impact positively on the student learning experience, in relation to learning preferences, needs and goals, and in both real-time classroom/field implementations and as a tool for distributed (asynchronous) IBL?
- What are the implications of the use of LAMS in terms of educational development support, organisational costs and processes, systems interoperability and technical support?
- What are practitioners' requirements for effective reuse of LAMS-based designs and what factors facilitate and/or constrain the sharing and reuse of LAMS-based designs within and across disciplines, and within and between institutions?
- More broadly, what are the learning design reuse requirements of a community of practice for development and innovation in IBL?

1.7 Project design and methodology

System set-up: The project used the *LAMS International* hosting service and maintained forum-based communication on technical issues with *LAMS Community* groups.

Preliminary LAMS demonstration: An introductory LAMS demonstration workshop was held on 19th July 2006, attended by academic staff and staff from professional services (educational developers and librarians).

Pilot user recruitment: Invitations to pilot LAMS were extended to academic and professional services staff (via a mix of general email invitations and personal contacts) at regular intervals during the project. Initially, invitations were targeted specifically at the CILASS faculties (Arts and Social Sciences) and within these, at colleagues with interests in experimenting with LAMS for IBL. Following the introductory demonstration, 13 staff were recruited in September 2006, with the creation of 17 sequences initially envisaged. Eight of these staff subsequently dropped out of the pilot group and sequences used in teaching were created by the remaining 5. Of 10 participants in LAMS training workshops held on 24th October and 15th November 2006, 4 went on to create a sequence used in teaching. One-to-one introductory sessions were provided to staff unable to attend workshops (12 sessions in total). Of 15 participants in workshops run on 1st and 16th February, 7 indicated plans to create sequences for their teaching and ultimately 3 created sequences that were used in teaching.

As a further recruitment strategy, an offer was made to all academic departments in the University to host a short in-house LAMS awareness/training workshop. This led to 3 further workshops (in Archaeology, Mechanical Engineering and Nursing and Midwifery), attracting 6, 5 and 4 participants respectively. From these, interest in LAMS was expressed but no firm plans for pilots emerged.

The project aimed to incentivise and reward participation with modest remuneration (equivalent of 1 day of academic buy-out at standard University rate) but this did not appear to impact on 'buy-in' to the pilot. Considerably more practitioners expressed interest in LAMS - some also experimenting with creating sequences - than went on to fully develop and use sequences with students in practice. Ultimately, it did not prove possible to achieve a portfolio of 25 LAMS sequences, as hoped, because of lower than expected pilot user recruitment.

Pilot user group: All but one of the pilot users were based in arts and social sciences disciplines, the exception being from an applied science. None had experienced using LAMS before. Most attended an introductory workshop about the system, during which they had an opportunity to use an example of a LAMS sequence created for an IBL activity. They described a range of reasons for participating in the pilot, including: perceived benefits of LAMS for the student experience and curiosity about specific 'design orchestration' features of the tool, including on-line peer collaboration and step-by-step progression for students through on-line tasks; personal motivation to experiment with latest developments in learning technology, in some cases because e-learning was a specific subject focus of their teaching; willingness to experiment with a new tool on behalf of the University.

Some pilot users expressed strong familiarity with the concept of IBL and had specialist interests in the development and use of IBL approaches in their teaching. Others were less familiar with the concept but identified aspects of their teaching as IBL-oriented. Pilot users did not tend to approach experimentation with LAMS from a 'high-level' perspective of implementing new general models of IBL (nor was this proposed by DeSILA) - but focused instead on ways in which the technology might fit with, and enhance, their existing approaches to using IBL in specific instances of teaching. It was also observed that most pilot users' interest in LAMS appeared - at least on initial acquaintance with the tool - to be more strongly oriented towards its potential for the orchestration of learning activity than for supporting the practice of creating designs. Some pilot users identified themselves as 'expert' or 'very familiar' users of learning technology, while others had little experience of this kind.

Training and pedagogical/technical support and monitoring: Following initial training and familiarisation with LAMS, pedagogical and technical user support expertise was developed in an ongoing way throughout the project, in response to support needs that arose. Oxford University Computing Services provided initial consultancy and training in the use and evaluation of LAMS.

A total of 5 training workshops attracted a total of 38 participants (13, 7, 3, 10 and 5 respectively). Short questionnaires were used to gather feedback from participants about their initial responses to LAMS as potential users (see Appendix 1). Those who embarked on designing sequences were offered follow-up support for creating designs, when desired, in the form of technical and pedagogical advice on a one-to-one basis, supplemented by some technical guidance materials.

Monitoring and recording of support, technical and organisational issues took place throughout.

Creation of sequences: The project resulted in the creation of 14 completed sequences for implementation with students - 10 of which were actually used by students - by a total of 12 academic staff from the following discipline areas: Automatic Control and Systems Engineering; Education; Geography; Information Studies; Law; Modern Languages**.** Topics included: introduction to blogging, e-learning, learning styles, reflective writing, article abstract evaluation, geographical visual methods, intellectual property. Both blended and distance modes were piloted. Library staff created a sequence for the purposes of team experimentation.

Pre- and post-implementation interviews: Pre-implementation interviews were carried out with 11 academic staff who intended to implement sequences with students. In 1 case it was not possible, because of time constraints for the practitioner involved, to carry out a pre-implementation interview; themes otherwise covered at this stage were therefore covered in a post-implementation interview. In pre-implementation interviews, practitioners were asked to describe how they understood and approached IBL in their practice; how they usually approached designing for learning; why and how they planned to use LAMS in their pilot (see Appendix 2 for interview guide). Short questionnaires were used to gather standardised baseline contextual information about planned pilot initiatives (Appendix 3).

Follow-up interviews were carried out with 12 staff; in 10 cases, sequences had been implemented as planned while in 2 cases they had not been implemented (in two case, two staff designed a sequence collaboratively). Post-implementation interviews explored design and orchestration experiences and outcomes in relation to objectives (see Appendix 4 for interview guide). The interview guides for both pre- and post-implementation interviews were relatively loosely structured, in order to allow for open exploration of themes emerging.

Where a member of staff designed more than one sequence in the same time period, the decision was taken to carry out only one pre- and one post-implementation interview. Interviews lasted between half-an-hour and an hour and were fully transcribed for analysis.

Classroom observations: Four observations of classroom implementations were carried out. Physical observation of distance sequences was not possible.

Student feedback: A total of 221 students were involved in LAMS user trials through the project. Questionnaires were administered to all of these students, to explore impact on learning experience and their responses to LAMS as a system. However, gaining student feedback and participation in evaluation proved difficult. The approach initially used (circulation of hard-copy questionnaire following the learning experience) did not elicit responses and therefore for later sequences feedback was requested immediately via a questionnaire embedded into a LAMS sequence backed up with a hard-copy of the same questionnaire. In total, feedback from 81 students was gained from five sequences. The project aimed to follow up questionnaire feedback with focus groups. Again, it proved difficult to recruit participants, even with the incentive of £10 for participation. As an alternative, one-to-one interviews were carried out with 4 student users. An additional evaluation session was run with 5 CILASS student ambassadors, who were invited to engage with a number of sequences, including those that had not as yet been used in teaching, and to provide feedback from the learner's perspective. Appendix 5 illustrates the student feedback questionnaire and follow-up interview guide, and includes quantitative questionnaire results.

Reuse and sharing workshops and focus groups: The theme of sharing and reuse of designs for learning activity (both in general, and in relation to LAMS) was explored through interviews with pilot users as described above, and 'reuse' workshops and associated focus group discussions attended by some pilot users and other academic staff from a range of disciplines. Two focus group discussions were held on June 7th 2007, each attended by eight participants from the University of Sheffield. Participants were shown a selection of LAMS sequences that had been produced through the DeSILA project and used in teaching. They were asked to note down initial responses to questions about LAMS and design, reuse and sharing on paper forms and then to participate in focus group discussion facilitated by DeSILA staff.

Three further focus group discussions, using the same interview guide questions, were held on July 9th 2007 at an event advertised within the University and more widely across the sector via CETL networks. Twenty-three participants, mostly academic staff alongside others involved in professional services roles, were asked to assess the potential of LAMS as a tool for IBL, gain some hands-on experience, and exchange views and experiences relating to sharing and reuse. Professor James Dalziel gave a keynote presentation about the latest version of the system and directions for future development. Examples of ways in which LAMS already had been used in a range of disciplines at the University of Sheffield were presented and participants were invited to consider the potential for transfer of these to their own subject areas and teaching, and to participate in discussion of some more general issues of sharing and reuse of designs. Three members of these groups were from other institutions. Appendix 6 reproduces the focus group interview guides and proforma.

Data analysis: All interview and focus group data were fully transcribed and analysis was inductive, using a thematic, grounded approach. Descriptive, frequencies-based statistical analysis was carried out of quantitative questionnaire data, and thematic analysis was carried out on qualitative data received via questionnaires. Completed sequences were analysed to identify key features and patterns in pilot users' use of LAMS tools.

Promotion and dissemination: Internal publicity and dissemination continued throughout the life of the project, targeted at: academic staff; professional services staff; senior managers, via: DeSILA project website; direct approaches to CILASS project leaders and champions; CILASS blog; CILASS Steering Group; University Learning and Teaching Development Group. The project was referred to in internal reports by PVC for Learning and Teaching and the UoS Senior Management Group. Flyers were produced and disseminated at relevant internal events, e.g. CILASS stall at Information Commons launch. Internal dissemination of interim project activities and findings was carried out using CILASS and University channels, including at the following dissemination events: CILASS IBL Café 28th November 2006; presentation to University Generic Skills Working Group, 22nd May 2007; Spotlight on Teaching, 25th May 2007; dissemination event July 9th 2007.

External promotion and dissemination was carried out mainly through a total of 8 conference presentations and workshops, including a presentation to CILIP UC&R group in Leicester, March 2007; Learning Through Enquiry Alliance conference, June 2007. One paper for publication (conference proceedings) was produced (Levy et al. 2008) and peer-reviewed journal papers are in the pipeline.

Designs were made available to other Design for Learning projects and the wider community via the DeSILA wiki and the LAMS community website.

1.8 Adjustments to project plan

A number of adjustments were made to the initial project plan and research strategy in order to better facilitate, and maximise opportunities for, recruitment, support and data collection.

Pilot user recruitment strategy: It was initially envisaged that recruitment, training, implementation and data collection would be carried out in three distinct 'waves'. Subsequently, the relevant project workpackages were developed more flexibly with a rolling programme of recruitment, support and research.

Broadening the community: Low take-up of LAMS by the CILASS 'core' community led to the decision to broaden study to a wider community, including other disciplines. This resulted in the recruitment of one pilot user from outside arts and social sciences, and in participation of non-arts and social sciences members of focus groups.

Theory of Change evaluation: It was originally envisaged that the 'Theory of Change' evaluation framework (see below) would be used at the level of individual pilot implementations of LAMS as well as at the level of DeSILA as a project. This approach was experimented with in early pilot implementations (see Appendix 7 for an example) but was found by practitioners to be inappropriate to the small-scale nature of pilots.

Design-in-action logs: It was initially envisaged that template-based 'design in action' logs would be completed by practitioners during their individual pilots, to record the process of creating LAMS-based designs. This strategy was abandoned in order to avoid placing undue burden on practitioners and because the data sought could be gathered via technical and pedagogical query logging and post-implementation interviews.

Reuse workshop: Initially it was envisaged that 3rd wave participants would attend a re-use workshop following initial LAMS training, to enable exploration of learning designs created by 1st and 2nd wave participants with a view to reuse for their own implementations if desired. The pattern of recruitment meant that this was not feasible and pilot users were introduced to learning designs created by previous users as part of introductory training workshops and one-to-one support sessions.

LAMS versions 1 and 2: We initially planned to use LAMS 2 from mid-January 2007, as arranged with the LAMS International hosting service. However, there were delays with the set-up of a LAMS 2 server and some on-going technical issues were only resolved towards the end of March 2007. This means that we were unable to fully evaluate LAMS 2 as hoped, but retained external hosting service for the academic year 2007-8 to continue exploration.

LAMS-WebCT integration: The intention was to explore LAMS-WebCT integration on release of an anticipated system 'power-link' for LAMS with WebCT Vista. It did not prove possible to explore LAMS-WebCT integration due to delayed release of LAMS-WebCT Vista system 'power link' to facilitate direct integration. In the absence of full system integration with WebCT Vista 4, and in the context of small-scale initiatives undertaken, staff did not connect to LAMS sequences via Vista modules. One sequence was designed to use LAMS with Moodle.

Modes of use: In-classroom pilot implementations were carried out in already-booked locations in order to minimise disruption to planned timetabling; CILASS collaboratories were not used for classroom-based pilots because of timetabling constraints. This meant that the project did not have an opportunity to observe the impact of LAMS use in collaboratory conditions.

1.9 Co-operation and networking

The project co-operated with the Programme's liaison, management and reporting arrangements and made connections with projects that had a particular bearing on the project.

1.10 Steering Group

The DeSILA Steering Group comprised representatives of key institutional stakeholder groups and external experts (Dr Liz Masterman, OUCS) and Professor Oleg Liber (University of Bolton). It met 3 times during the project, as planned.

1.11 Sustainability

The project aimed to assess the value of possible roll-out of LAMS across the wider institution, both within the specific context of IBL and more generally. Consideration was given to future options for in-house versus external LAMS hosting and for moving forward with LAMS-WebCT integration.

1.12 Deliverables

The project has delivered:

- Implementation and evaluation of LAMS in a specific, real-life 'case study' context of pedagogical development and innovation for IBL in HE;
- A report on the impact of using LAMS on designing for IBL in the case study context, including a conceptual framework for sharing and reuse of (LAMS and other) IBL designs within a community of practice context;
- Recommendations for effective embedding and use of LAMS for IBL, as regards implications for: academic practice; educational development and support; technical support; institutional policy and strategy; development of learning design systems.
- A portfolio of LAMS-based IBL learning designs, embedded into case studies of discipline-based LAMS use, plus a case study focusing on development/training sequences produced through the project.

1.13 Project-level evaluation framework

The project applied the University of Sheffield's institution-wide approach to evaluation of learning and teaching development initiatives, which is also used by CILASS. This is an impact-focused approach that combines Theories of Change (ToC) evaluation methodology with an EPO (Enabling, Process, Outcomes) approach to performance indicators (Connell and Kubisch, 1998; Saunders, 2001). It is useful for exploring connections between the expectations and assumptions that inform a change facilitation project and its outcomes. A ToC statement was established that identified evaluation indicators (see Appendix 8) and the project-level evaluation was based on: a) on-going feedback about LAMS training and support during the life of the project; questionnaire-based feedback from pilot LAMS

users at the close of the project (Appendix 9); 'core' project team reflection during and at the close of the project. The DeSILA project ToC was used as a point of reference for the writing of the final report. Appendix 10 provides brief further comment on some key processes and outcomes of the project from an institutional perspective and what has been learned from the process of carrying it out.

1.14 The report

Section 2 of the report presents its main findings. These are presented thematically, drawing together qualitative and quantitative data from different sources as appropriate. Quantitative data from student feedback questionnaires, and from the final DeSILA project questionnaire, are cross-referenced to the appendices in which they are presented in full.

Section 3 of the report offers a summary and discussion of the findings, and Section 4 provides concluding remarks and recommendations.

2. Findings

Thematic analysis based on the range of datasets collected by the project is provided here. The source of quotations is indicated by the following codes: PI = practitioner interview; SI = student interview; PFG = practitioner focus group; PFQ = practitioner feedback questionnaire; SFG = student focus group.

2.1 Inquiry-based learning

The view that it involves *"getting people to learn through doing research"* (PI) was the basis of practitioners' views of what defines IBL. This in some cases meant that IBL was perceived as closely aligned with formal, discipline-based research practice, as in the view of it as *"synonymous with the whole research process from question formulation all the way to presentation of the research findings"* (PI). Practitioners sometimes highlighted a systematic, problem-solving dimension in IBL. In other cases, the research process engaged through IBL was perceived as a more general process of critical (and self-critical) questioning, exploration and investigation, with IBL defined broadly as encouraging 'inquiring' students to set their own learning goals, plan and direct their learning, and reflect on the outcomes.

Practitioners often identified the development of learner autonomy as central to their pedagogical purposes in adopting IBL approaches. Typically expressing a desire to *"help students learn for themselves"* (PI), they spoke of themselves as facilitators of learning rather than as teachers or instructors: *"kind of letting them teach each other and teach themselves"* (PI). Some pointed to challenges they experienced in this role, in stepping back to allow students greater freedom than is usual in higher education teaching or entirely comfortable at a personal level for tutors. IBL was often characterised in terms of 'open-endedness', providing opportunities for students to pursue differing lines of inquiry or arrive at different outcomes. For example:

> IBL could have a single answer at the end of it, but many approaches to getting to the answer. Alternatively it might have one approach with many different answers, or it might have many approaches and many different answers to that original question, or problem (PI).

A strong process focus was often emphasised, with the purpose of enabling students to learn how to embark on, and pursue, self-directed inquiry:

> It's that notion that [students] have to learn how to approach a task […] What I would like them to get out of it is not the end result of the process […] it's to focus them on the process of getting to that […] in the process of which they need to do a fair amount of inquiry (PI).

While practitioners indicated that the aim to foster learner independence and autonomy was fundamental to their pedagogy, they envisaged a range of different approaches to providing guidance and scaffolding for students. Some of these could be characterised as more strongly teacher-led approaches and others more strongly student-led. For example, IBL was seen as a pedagogy that could be oriented, depending on the context, towards enabling students to pursue *"their own interests that they wish to investigate"* (PI) or towards *"students searching for answers to someone else's questions, and having to reflect on certain points of the inquiry"* (PI). The 'purest' forms of IBL were often seen as those in which students both devise their own research questions and direct the development of their projects with guidance and support from supervisors or tutors. Individuals often explained their own inquiry pedagogies in flexible terms, stating that they would adopt more strongly

teacher-led and tightly structured, or more strongly student-led and loosely structured, forms of IBL according to the circumstances of different educational contexts. For example:

> There are two ways to carry out an inquiry, one is to be very explicit and say this is the inquiry you are going to carry out, and it will have the following steps, and the reason for doing it is this, and you are going to do this and this. So that is going to build into an inquiry, a kind of scaffold […] the other type of lesson might be the whole lesson itself mirrors the process of inquiry so students don't know where they are going, they don't know why they are going there. They will find that out and it is actually the experience of not knowing where you are going and making sense of it that is important […] I will use different approaches at different times with different levels (PI).

Some of the practitioners who participated in the pilot identified themselves as experienced designers of IBL, whereas others considered themselves in a more 'novice' position in relation to the pedagogy.

2.2 Design

Practitioners often reported using pen and paper to draft the design of learning activities and content. . Powerpoint and Word, the only digital tools reported (they did not perceive the University's VLE as a design tool) were both commonly used, sometimes in conjunction with each other; for example, extended lecture notes in Word might be based on points initially noted and structured in Powerpoint. Both narrative and visual approaches to design were reported. For example: *"It is a case really of trial and error. I need to put things into Word, I am a verbal learner so I will sit and write a narrative of what I want"* (PI); *"I find it easy to use pen and paper to mindmap and draw diagrams - sequences and concepts - which is easier to do than on the computer screen"* (PI).

Practitioners characterised design for learning as a highly contextualised practice, with specific 'learning outcomes' normally providing an initial point of departure and a wide range of contingent factors - such as student level and numbers, cultural considerations and timetabling - taken into account. Within this broad frame, two key dimensions of differentiation emerged in accounts of design for learning. We label these, respectively, the 'content/process' dimension and the 'generic/personal' dimension, in the description that follows.

2.2.1 Content/process

When approached from the perspective of content, considerations of subject-matter were the primary point of departure for design: *"I would say my teaching to some extent is content-driven. What content do I want to communicate to students?"* (PI). When approached from the perspective of process, objectives relating to students' learning experiences and activities were the primary point of departure: *"I think first about the learning activities and then I try to find content to fit it"* (PI). The design of assessment activities was sometimes highlighted as an integral part of a process-oriented approach. One practitioner described focusing first on objectives relating to students' "holistic" experience of learning, and then on specific learning content and activities:

> I used to start from what content I want to put in. I think that leads to poor design so I now start from, what do I want the students to get out of it. I don't mean in terms of learning outcomes, I mean in a bigger holistic experience so

> not just what do you want them to be able to do at the end of the course, but what experience do you want them to have of learning, and I start from there and then I think OK, what is the content and we can put in this and also what are the activities and approaches that are going to foster the experience that I am looking for (PI).

Some practitioners explicitly associated IBL with broadly process-oriented approaches to design, whereby the aim is to create the conditions for particular experiences of learning through the design of inquiry and assessment tasks:

> The learning is being achieved by collaboration and joint knowledge construction and so what is more important than the content or the materials, is the process by which people learn (PI).

Individual accounts of designing tended to illustrate orientations towards either content or process considerations as a point of departure. Others described an integrated perspective in which content and process were seen as inseparable and in dynamic interaction: designing was described in these cases as an iterative process of movement back and forth between process and content related considerations. One practitioner argued for 'balance' between focusing on process and focusing on content:

> I think there is a danger when you rely on activities and tasks that why you are doing it can get lost. It is the balance of thinking, what is really important in the subject, and what it is really important [students] engage with, also thinking what they can contribute as well (PI).

2.2.2 Generic/personal

Two further broadly contrasting approaches to design for learning were identified. Some practitioners described designing largely in terms of drawing on their own personal conceptualisations of the processes or subject-matter with which students were to engage. They often drew attention to the emergent and organic nature of the design process in this context and the need for responsiveness to immediate contextual factors 'on the fly' in the classroom. Others described drawing on different types of generic framework, whether process- or content-oriented. None described the use of a specific pedagogic process or activity model. However, 'generic' frameworks were evident in descriptions of design as the creation of sequences of learning tasks based on knowledge structures, or procedural activity structures, that were identified as embedded in disciplinary or professional practice. Practitioners in science disciplines were more likely to draw attention to the role of generic knowledge structures in design for learning than those in arts and social sciences; generic procedures were identified across all the discipline areas represented in the evaluation study. An established knowledge structure could make 'design' - viewed in terms of content-sequencing - an almost redundant concept. For example:

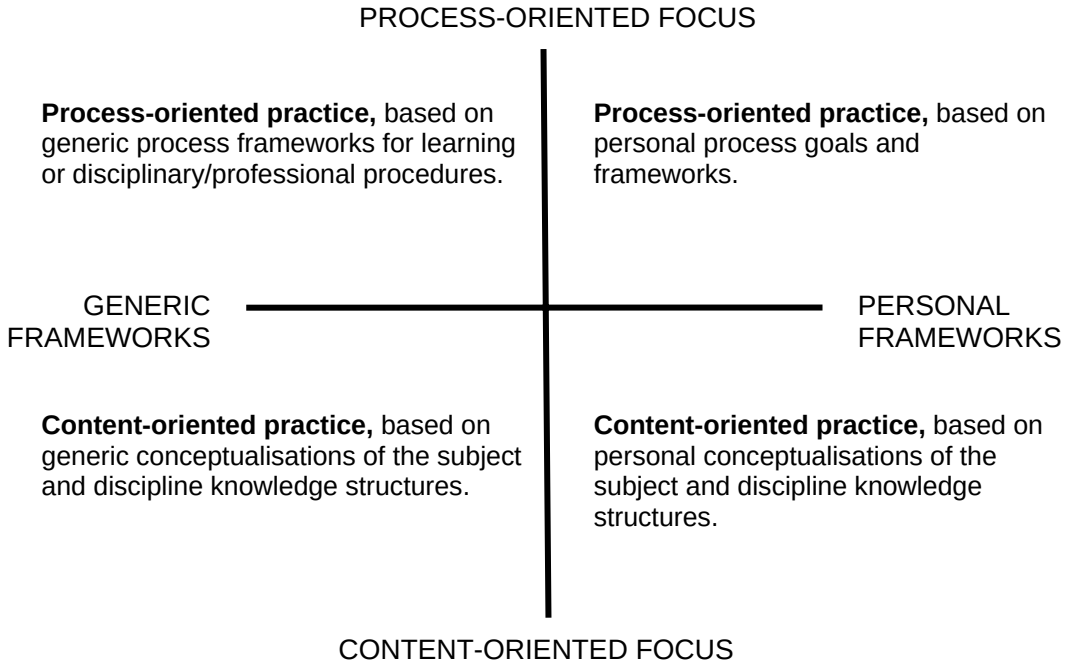
> Because you need to know X before you can do Y, in fact planning the lecture content is pretty much - there is no planning to do. It is really how much time you give to topics, and the topics naturally build on top of each other (PI).

Similarly, the existence of an established procedure could make the activity sequencing element of design a matter of 'step a' necessarily needing to be followed by 'step b' and so forth.

2.2.3 Representing approaches to design

Figure 2 represents the two main dimensions of variation in designing for learning, as reflected in these practitioners' accounts. The vertical axis differentiates, on a continuum, between considerations oriented primarily towards students' experiences of learning, and those oriented primarily towards subject-matter. The horizontal axis differentiates between those that are inflected more by 'generic' pedagogic or disciplinary frameworks and models, and those that derive more from practitioners' personal pedagogical goals and perspectives. Presented as a matrix, the framework identifies four distinct approaches to (or, more properly, emphases in) design for learning. As a simplified version of the understandings and practices that it aims to reflect, the axes of the matrix are based on continua that may well dissolve in the complexity of specific contexts.

Figure 2: Approaches to design for learning



2.3 Sharing and reuse

Practitioners in this study typically described design for learning as an iterative, evolutionary practice. Based on student feedback and what they, as individuals or teaching teams, perceived had 'worked' or 'not worked' educationally, adaptation of individual learning events could range from making small tweaks from one instantiation to the next, to creating a completely revised design. For example, one practitioner described how, while subject content might not change, 'delivery' always would:

> For some theoretical areas I might use the same slide. But anything I do, I never use exactly the same as the year before. Whenever I deliver some teaching, I can usually see how it could have gone better. From the very simple level of I tried to get too much in, to if it is an activity or exercise seeing how it can be tweaked better. Reacting to students' questions or things that

> they did and learning about new things makes me think, we can try that out. (PI).

When asked about drawing on resources and ideas generated by others in revising or creating new designs for learning, practitioners typically talked first about reuse of content rather than reuse of activity designs.

2.3.1 Content

Practitioners cited a range of local and other sources of content for teaching, including academic books, journals and conferences. They frequently mentioned using the Internet, including as a source of images and up-to-date news coverage. However, few reported drawing on subject content that had been created specifically for the purposes of learning and teaching, whether digital or otherwise. None had used digital 'reusable learning objects', or had accessed national or international repositories in which these are made available. In some cases, the experience of design for learning as a highly personal, emergent practice could mean that the very concept of 'reuse' was alien: *"I tend to make it up as I go along and so almost by definition I'm not reusing other people's stuff"* (PFG).

Those who did report reusing content produced specifically for learning and teaching described drawing on content produced locally by colleagues in their own departments, typically in the form of handed-on lecture notes or Powerpoint slides. VLE-based content reuse was not mentioned. A broadly 'off the shelf' approach to content reuse - albeit with evolutionary adaptation over time - was described in relation to disciplinary contexts that were characterised by high consensus on, and stability of, the knowledge base (often, in pure or applied sciences):

> "Within [my subject] it's very much a culture of handing down work, you know, from lecturer to lecturer. So when I started as a new lecturer I was given someone else's notes which I've since sort of adapted, grown and changed, and that's certainly been the case in certainly every subject I've taught […] the thing is, it's fairly static content and it's not working at the boundaries of research […] the foundations are very much set in stone, so therefore it doesn't make sense for a new lecturer to start from scratch" (PFG).

Other practitioners described a greater degree of adaptation in their reuse of content generated by someone else. They described drawing on discrete objects such as images, texts or Powerpoint slides and weaving these into their own content. For example:

> The whole story's never in the Powerpoint and you've got to understand the Powerpoint […] but there might be bits of a Powerpoint and particular images and particular points that can be quite useful but I think the overall structure needs to be reworked from scratch (PFG).

> With Powerpoint you could either borrow someone else's whole Powerpoint or you could borrow an individual slide, but of course most commonly we might borrow a small sequence of slides and change it for a different audience […] and obviously you might end up re-sorting them (PFG).

2.3.2 Learning activities

Practitioners' experiences of, and attitudes to, sharing and reuse of learning activities varied widely. Some perceived the institutional culture, and their own departmental

cultures, as relatively weak in terms of encouragement to share and reuse activity, or even discouraging. For example:

> We don't have [a departmental sharing] culture. You're supposed to have your own protocol, your own content […] all I was told was that, 'no, you're supposed to have your own protocol and it's best if you have your own' (PFG).

In contrast, others were accustomed to some degree of informal exchange of ideas and materials relating to learning activity design. In the main, sources of information and ideas were again very local - within their own departments or (less frequently) the wider University, rather than beyond the institution. Some practitioners described viewing 'lesson plans' via departmental shared drives or had had their attention drawn to specific activities by colleagues. Powerpoint was identified as a major vehicle for collective sharing and reuse of activity design as well as subject content in some cases. For example:

> You share Powerpoint presentations. That is the way most people in this department do most of their planning and delivery via a Powerpoint presentation, and by sharing that, they are sharing all their plans. Interesting, I had never realised the central role that Powerpoint plays [in design for learning] (PI).

Some participants described visiting colleagues' classrooms from time to time to learn from their practice (and comply with institutional practice on peer review), or looking at the way in which others had designed activities using the University's VLE. Attending staff development courses had prompted some to seek ideas for learning activities in relevant educational literature, and ideas were garnered from attending conferences or through membership of online discussion fora.

Gathering ideas about learning activities was, in the main, described as a largely informal, serendipitous, *"hit and miss"* (PI) process of *"lateral discovery"* (PI) rather than of systematic information-seeking:

> It's a bit of a magpie approach, isn't it? You've seen something there that was nice and bright and sparkly and that worked very well. I pick up all sorts of things if I'm doing an observation with somebody (PFG).

More focused sharing of materials and ideas was likely to occur in contexts where a number of staff taught a common programme as members of a team or where collaborative teaching took place: *"We share ideas freely and willingly […] because we're all doing the same thing and we want to do it as well as we can"* (PI).

> I wouldn't say we're trawling around looking for ideas. I think we're always reviewing the way we do things within the subject teams, within the small teams for the subjects we discuss it a lot […] more so than searching around externally for ideas (PI).

Those practitioners who experienced subject teaching as a highly personal, contingent practice tended to emphasise that their reuse of activity designs or ideas generated by others would normally involve a significant degree of tailoring and transformation. For this reason, some preferred to use the words 'refocusing' or 'adaptation' to 'reuse'. They were seeking inspiration rather than directly transferable designs and assumed that personal style would impact strongly on the way in which a learning design would develop:

> You see something that one person does, and you might reuse that idea although [afterwards] you would never be able to see the link between the two because it started off a chain of thought in your own mind as to how something could happen (PFG).

For some, 'off-the shelf' transfer of an activity design was incompatible with the need they experienced to engage personally, at a deep level, with the process of preparing a teaching session:

> I feel in order to be able to teach something I need to have gone through the process of preparing the session […] and just taking someone else's I'll probably miss out some learning step […] I've just never been very good at reusing other people's material, I've always done it from scratch (PFG).

On the other hand, while preparing repeat teaching 'from scratch' might be a professional ideal, the pragmatic benefits of sharing and reuse, especially in relation to the saving of time, were widely recognised:

> You know, I might have two hours to prepare a module's teaching for a week or something and to kind of get together resources, not to mention ideas of where to go, it can be literally impossible [to go back to first principles] unless I'm prepared to work every weekend, which I'm not (PFG).

Practitioners appeared more likely to accept the value of 'off the shelf' reusable activities when content was perceived as generic. This was reflected in attitudes towards the teaching of 'generic skills' topics in areas such as IT or information literacy. For example, one practitioner differentiated between subject teaching (experienced as highly personal and contingent, and less amenable to reuse) and teaching of generic content (experienced as less personal and therefore more amenable to 'off-the-shelf' activity reuse):

> I wouldn't ever plan anything with a view to reusing it next year. On the other hand, basic things like IT and how to use IT I've certainly looked at how other people have done it because I don't want to be reinventing the wheel (PFG).

2.3.3 Representing attitudes and approaches to sharing and reuse

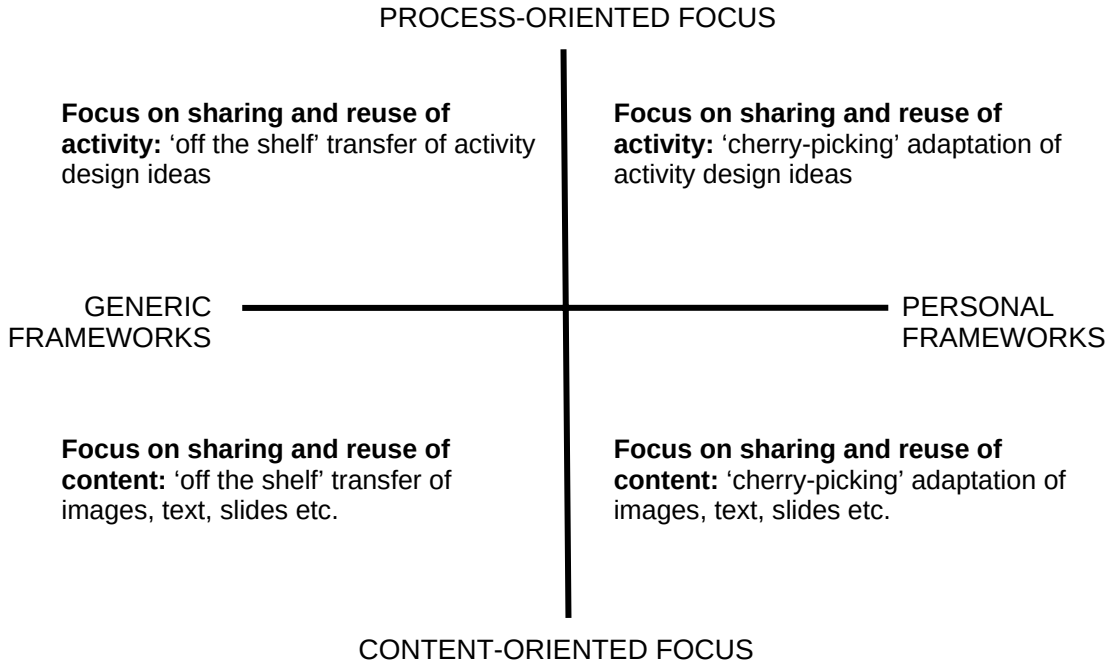
The extent to which teaching (and by extension, design for learning) was experienced as a personal or generic process emerged as a key factor underpinning different attitudes to, and experiences of, sharing and reuse. As noted, many practitioners described teaching as a highly personal practice in which individual creativity and style, as well as responsiveness to contextual factors, played a significant role. They were likely to conceive of both content and activity reuse in terms of inspiration and *"cherry picking"* (PFG) of ideas for the purposes of adaptation.

At the same time, design for learning was described from a more 'generic' perspective by practitioners from disciplines and subject areas characterised by high consensus on either subject knowledge or procedural processes, or who were teaching generic skills topics. In these contexts, practitioners were more likely to have experienced reuse of both content and activity designs as something closer to 'off the shelf' transfer, and to express less ambivalence about the concept of reuse.

Reflecting these findings, Figure 3 maps practitioners' attitudes and approaches to the reuse of learning activities and content onto the framework presented in Figure 2, identifying four different broad orientations towards sharing and reuse. Again, each of the dimensions on the matrix is intended to represent a continuum rather than an oppositional binary. In practice, individual attitudes to, and experiences of, sharing and reuse are likely to be a matter of emphasis, as conveyed by the quotation below in which a broadly 'generic' approach is inflected by personalisation and adaptation:

> "We tend to follow a common programme, so if I've got something that's worked well with my students I'll say to colleagues, you know, here's something for Level 2 […] such and such, but even then I think […] you will end up adapting it and tweaking it at some point" (PFG).

Figure 3: Attitudes and approaches to sharing and reuse of learning designs and content



2.4 Designing with LAMS

The following sections highlight practitioners' responses to LAMS as a design tool, in particular for the purposes of IBL.

2.4.1 Linearity

All practitioners perceived 'linearity' as the principal characteristic of the way in which LAMS supports - and shapes - design for learning. This was reflected in a range of metaphors and similes they used to describe it. Most of these - ladder, interactive workbook, industrial flowchart, training manual, Powerpoint slideshow, sequential computer game, Russian doll - conveyed a strong sense of LAMS as a tool for designing and reinforcing linear learning pathways. This modelling of learning and its facilitation as step-by-step, forward progression was identified as either positive or problematic for IBL, depending on pedagogical purposes and context.

On the one hand, these characteristics were welcomed as a means of reinforcing sequential inquiry processes and procedures: *"I think it is really good for some types of learning to have a clear pathway"* (PFG); *"One step builds on the other and* [students] *don't have to do it all in one go, they can go in, dip in and out, have the chance to reflect"* (PI). Practitioners from disciplines or subject areas with clear linear knowledge structures or procedures - including in Engineering, Information Technology, Languages, Maths, Nursing - saw LAMS as a tool to reinforce these and the skills that correspond to them:

> If the purpose is to try and persuade people that they need to have absorbed a particular set of skills or absorb a particular piece of information before they can go on to the next stage, then that seems to be quite good (PFG).
>
> You have to encourage the students to do things in a particular order and to understand something properly before they move on to the next step. LAMS is quite good at doing that (PI).

LAMS often was perceived as especially suited to the design of bite-size sequences of activity - *'breaking things down into little chunks'* - that would scaffold students' engagement with larger, more complex processes. It was also suggested that the clear, linear progression of a LAMS sequence could prove a powerful means of instilling a sense of learner achievement:

> With WebCT with it being quite freeform and not trying to impose too much on you, we've found in the past that it's quite difficult to instil a sense of achievement for the student because they're not very good at setting their own learning objectives for a session […] they seem to be deflated after than non-linear approach. With LAMS you can go through the sequence and it's got a beginning middle and end and when you get to the end you can go, done that, thank-you very much' and you feel a sense of achievement. So I think that's an interesting thing and […] some of my students would love it (PFG).

One pilot user experienced advantages of the 'linearity' of LAMS in an intercultural e-learning context:

> The linear design and concrete nature of LAMS was a distinct advantage in the intercultural e-learning setting in which I used it, because it meant that the Chinese learners, who were communicating in English as their second language, could be supported by LAMS in their learning. Because the technology supported their activity, it meant that the requirements fro online communication were reduced and it assisted their active participation in learning (PFQ).

On the other hand, linearity was perceived to be in tension with more open-ended forms of disciplinary inquiry and therefore with IBL approaches that themselves emphasise open-endedness and iteration, and allow for digression. From this perspective, the design functionality of LAMS was perceived to be oriented more towards *"programmed"* learning or *"training"* - even when it was recognised that *"it doesn't have to be like that, it depends how the sequences are written"* (PI). The version used in the trial did not allow for the design of sequences through which students would be able to move rapidly and then return to the start or other points along the way, or return to activities they had already exited. 'Branching' options to easily facilitate the creation of multi-level, in-parallel activity sequences were not yet

available. These were seen as major problems by those practitioners who conceived of IBL as a fundamentally iterative and 'parallel-processing' experience:

> Trying to make [activities] linear is sort of actually reinforcing the students' idea that it is all simple and easy […] If you're emphasising that [inquiry's] not a step-by-step process, then you know, it's a bit counter-productive if they then have a sequence that's entirely linear - it's sort of going against the learning goal! (PI).

> It assumes that your learners move from a to b to c to d all the same, whereas we know they are all different. So it's seeing learners as all the same rather than seeing them different, and that may be OK for some things, but not ok for others, and we need to understand that more I think (PFG).

Others saw the linearity of LAMS sequencing as seeming *"to want to impose"* (PI) a serialist rather than holist learning style, or as incompatible with the learning approaches of specific groups, such as postgraduate professionals: *"The way they learn is not linear but more individual reference around their experiences. LAMS is not quite flexible for that"* (PI). Some pointed to an inflexible sense of in-built, stage-by-stage closure associated with the sequential model.

The value of LAMS as a tool to design more complex, holistic and longer-term inquiry processes therefore was questioned. For example: *"I wouldn't see it as a vehicle for heavy-weight, reflective inquiry-based activity, but I think it's something that's nice to put in your sort of blend of teaching"* (PI).

> I can see it's got some potential in terms of sort of problem-based learning. I think the more open-focused IBL, I think you have to be very creative with your sequences or your instructions to students because of the linearity of the sequences (PFG).

The enhanced design features of a later version of LAMS were welcomed by a number of practitioners as more promising for IBL than Version 1, because of the greater flexibility for enabling iterative and multiple pathways through an activity sequence: *"I may structure entire teaching sessions around it, I can see its potential at representing the* [inquiry] *designs I would want to implement"* (PFG).

2.4.2 Structure and control

In general, practitioners perceived LAMS as a tool for designing tight activity structures with relatively high levels of teacher guidance and control. Some could quickly envisage designs that they considered would offer students some degree of autonomy and responsibility in the inquiry process, within a supportive framework: *"You can set them off [with a question], suggest a few resources, and let them run with it. I think it will be very useful"* (PI). 'Tight structure' often was identified as a welcome feature in the context of introductory forms of IBL, for example *"for undergraduates, first year students who need strict supervision over their progress"* (PFG).

> I think in some ways you can use it as a workbook and it could become a rather directive pedagogical tool. So it could be a "now do this, now do that" approach […] but I actually think with students who may not be familiar with IBL, LAMS offers in its structured way, a very good way of scaffolding them […] I think it does help, if you like, more novice IBL learners, you can use the

> discussion boards and forums and set specific tasks. It is not entirely open-ended inquiry (PI).
>
> Because a lot of my teaching happens at Level 0 or Level 1, I think the fact that it structures and scaffolds is in many respects an advantage in helping facilitate IBL in teaching in fact. So I think the closed, linear nature of it is quite valuable for opening people up or for guiding people towards ways of inquiry while still holding their hand to a greater or lesser extent (PFG).
>
> I didn't see [LAMS] as prescriptive as much as guidance, as it were, because I have IBL sort of activities in my teaching which obviously are not prescriptive. You know you kind of give them a broad area and they go away and inquire and they could end up anywhere and I like using it. The students do get a lot from it but I wonder if they actually need a little bit more guidance. They need to be walked through a set of resources, but allowed freedom within that walk-through, and I saw this as giving them a little bit of structure, just enough that they're walking in creative ways and to creative places rather than ending up in cul-de-sacs which obviously can happen in any research process (PFG).

The potential for the teacher to *"lead by the hand"* (PI) - even at a distance - was seen as very helpful in some contexts, not least to ensure that students would engage with tasks as set:

> I like the fact, and I don't like to use the word 'force' - but I like the fact that it does force students to actually do it, because for me if I want students to discuss something and then move on to another activity, LAMS will allow me to do that (PI).
>
> I could be totally wrong, but for WebCT, I don't see a way to force students to take part in a discussion before being able to look at my module handout so again that is another advantage (PI).
>
> It gives you a really powerful way to structure independent learning so that when you come to the [face-to-face] tutorial you know they have actually gone through some of those steps they need to have done (PFG).
>
> I found it a particularly helpful tool in getting the students to participate in IBL outside contact time. I felt that the LAMS sequences gave the students a framework within which to work but was not too restrictive to prevent IBL (PFQ).

Having used LAMS to design sequences, several practitioners commented on the value to them of being encouraged to provide specific guidance and pathways: *"I also quite like it because it reminds you as a teacher to include certain elements and explanations and so on* (PFG).

> It forced me to be very clear at each point exactly what I wanted from the students because you have to write some of these little signposts for them […] It certainly made me think very specifically about what tasks they were accomplishing at which times. So it did make me break things down a little more mentally (PI).

On the other hand, the perceived in-built orientation in the system towards tight activity structures was seen to militate against the principles of open inquiry and

student autonomy. The extent to which LAMS could accommodate student ownership of their learning process was questioned. There was a widely shared sense, both on initially encountering the system, and after experimenting with design, that LAMS was a tool that most obviously supported - and therefore encouraged - strongly teacher-led pedagogy: *"I think LAMS lends itself to a teacher-driven approach; in our course we'll not do that, that often"* (PI).

> It's like an industrial flow chart, you know, and then what you do is sort of ok, the questions go here. So then you think up a question and kind of stick it in because that's where the questions go (PFG).

Practitioners were much more likely to identify LAMS as a tool for creating strongly teacher-led IBL designs than to recognise potential for creating more student-led designs - a view that appeared to be further reinforced by viewing sequences that others had produced: *"You want the students to frame the research question and they can't do that with this"* (PFG). *"It's very much teacher-led because the teacher pre-determines everything. So the questions are not student-led, are they, or the activity, which it should be in IBL"* (PFG). Some practitioners explicitly identified LAMS with instructivism and behaviourist or didactic approaches to teaching:

> LAMS in itself has quite a kind of mechanical, kind of instructivist model of teaching built into it. You do what you're told to do and answer questions. It's all programmed while IBL is a more open process and that will be better in getting people to go off in their different directions [...] I don't see LAMS as having any orientation towards IBL really (PI).

> LAMS is an instructional design approach that pre-determines what is to be learned, requires each step to be built on the previous step, resulting in a learning design that is determined in advance and is very difficult to change. The learner is required to think and act within the boundaries that have been set by the teacher. In some contexts this is an advantage. For us, however, these instructional desing characteristics are not necessarily compatible with postgraduate IBL […] This requires a more 'open' and 'negotiated approach that is learner-led (PFQ).

One practitioner posed the question:

> It's like conducting an orchestra […] LAMS can if the conductor tutor wishes, really impose strict limitations on the students, you are not going to start playing until you finish this […] Really what I am trying to do is learn how to orchestrate less […] How might the students themselves orchestrate the learning experience? (PI).

Perceptions of LAMS as affording tight activity structure and teacher control were generally to the fore early on in exposure to LAMS. Initial perceptions could shift over time:

> I have had different stages in approaching LAMS […] I am beginning to see possibilities for LAMS sequences which nevertheless allow learners' autonomy […] In other words I am finding ways of overcoming the apparent, or what initially appeared, a very constrained form (PI).

The concept of 'students as designers' emerged in some interviews and focus group discussions, as a means of empowering students to take greater control of their learning experiences. Interest was expressed in experimenting with how this might

be achieved in practice with LAMS. Practitioners envisaged setting tasks whereby one group of students might design a sequence for another group, or staff and students would work collaboratively on design for learning:

> I really just love this idea of sort of working with students, sitting there and saying OK we've got this course module to do, what's your favourite approach? Do you like doing this or that? And actually putting it together with them and having them make decisions about how they're going to learn as well. You know, I would never sit and do that in WebCT but I think I could do it with this. I don't know, it just gets you thinking (PFG).

2.4.3 Easy process design

The majority of the practitioner-users in the DeSILA pilot did not consider that their initial engagement with LAMS had had a radical effect on their design thinking. Some used LAMS to transfer already-implemented face-to-face sequences of activity into an on-line sequence, while others created new activities but did not feel that their pedagogical thinking had been altered through interaction with LAMS. However, some expressed a sense that engaging with LAMS could impact, alongside other influences in the institutional environment, on orientation towards more process-focused approaches to design:

> That has been a major change. looking at students' learning as an activity rather than something into which you input readings and output in the form of essays […] I think [LAMS] is an easy way to get into thinking about teaching and learning in terms of activity (PI).

Practitioners with more strongly process-oriented understandings of design were more likely to perceive differences between LAMS and WebCT : *"It definitely can do something WebCT doesn't do and I can see a place for it supporting activities in different kinds of learning"* (PFG).

> For [this topic] which is very much activity based and collaborative learning, I was completely lost [about how to use WebCT] […] then when I went to the [LAMS] session and saw basically the sequential activities and how that can facilitate group learning and working together in an online format, I thought that is the perfect solution […] I will use WebCT for things like posting reading lists, you know, like module handouts. But this very much fits my workshop face to face setting in terms of the activities (PI).

Comparing LAMS with the University's VLE, practitioners identified the way in which it appeared to move the focus away from *"overloading with material"* (PFG) and offer more control in guiding student progression through activities: *"rather than putting everything there within WebCT and saying 'go for it"* (PFG). One practitioner saw it as *"a junior VLE in a way, it leads you along to a way of thinking and everything, and I think we will use it quite a bit"* (PFG). Practitioners typically envisaged using LAMS in conjunction with WebCT or another VLE. For example:

> I'd like to use it in conjunction with WebCT, because I think they both [WebCT and LAMS] have strengths, and putting them together will create a powerful - whatever it is you are trying to do - module or tutorial. I think they complement each other (PI).

Several pilot users observed that it was possible to design activity sequences in MOLE without using LAMS; however, one used LAMS to run activities in a way that had not appeared possible in MOLE:

> I was a bit lost for a while because I wasn't sure how I could use WebCT to do the activities I wanted students to engage in - but LAMS seems to be the perfect answer […] so ideally I would be using WebCT for the lecture part of these resources (e.g. lecture notes etc) and LAMS for the activity part of these resources - I would want and need to use them in conjunction with each other (email communication).

Pilot users of LAMS sometimes worked with pen and paper to sketch out their designs prior to using the system itself. Others worked directly in LAMS from the outset, sometimes with the help of the DeSILA project adviser. Designing with LAMS was generally described as an iterative process in which it was easy to build up and change the sequence of activities, and to populate them with relevant content, links and instructions. All five respondents to feedback questionnaires confirmed that they had not found LAMS difficult to use, from a technical perspective, given the support available.

There was a perception that in offering a relatively limited set of possible 'activities', reliance on LAMS as a design tool could serve to limit creativity in design practice. Views on the attractiveness of the design interface were mixed but the value of its visual element was commonly highlighted, as was the ease with which multimedia content could be incorporated into sequences. Users of Version 1 had a number of suggestions for features that would offer enhanced flexibility for both teacher and student. These included: a tool to support collaborative design; capability for creating 'branching' in sequences; capability to enable easy return to previous activities in a sequence; capability for design 'on the fly' in the classroom; 'copy and paste' capability from one sequence to another; capability for students to generate content for voting topics and to create a structured learning log. Some of these suggestions are being addressed by on-going development of subsequent versions of LAMS.

LAMS was often seen as an easier tool to use than the University's VLE. User responses to ease of use varied somewhat but overall the relative ease of creating designs with LAMS, with initial support, was perceived very positively, both in terms of the speed with which it was possible to 'get up and running' and the ease of making adjustments during the design process: *"I would not underestimate it is very quick and easy for me to create"* (PI).

> This works for me, I see this, I could bring my IBL into this course and I could build some resources for it and make it work by next week, you know, because it doesn't seem very complicated (PFG).

On the other hand, some practitioners described experiencing their own initial responses to the tool as mechanistic and unreflective, emphasising the value and importance of pedagogical reflection, discussion, guidance and exemplars. For example:

> I think in a way it is a bit too easy in the sense that it invites you to think you can create - and then, the truth is, it's very easy to make boring e-learning. The tool, as you know, is easy, but what you don't know is how you should use it (PI).

> It's very, very easy to build up the box, the discussion forum, and chain them together and before you know where you are, you have a sequence of one thing leading to another. I suppose that's a naive way of using LAMS [but] I have found it very difficult to get to the stage where I can appreciate that LAMS can allow you to do [something more flexible for learners]. One of the dangers is just how quickly you can zap up a design (PI).

This practitioner said s/he would, another time, aim to *"stand back"* from the tool and plan a design before creating it in LAMS:

> I think I would not rush to develop the LAMS sequence so quickly. The trouble is it looks exciting, it's new, it's easy. You get zoomed into it and think that is all it can do […] My major difference will be to not just go in and start playing (PI).

Another said s/he would spend more time thinking 'on paper' before creating a design in LAMS, in order to better consider which tools to use to suit her pedagogic purposes.

2.5 Reuse and sharing of sequences

Practitioners' responses to the idea of sharing and reusing LAMS sequences were consistent with their general experiences and attitudes to sharing and reuse. Focus group participants identified both content and design ideas in the LAMS sequences they viewed that could be transferred, with adaptation, to their own context. They tended to see the examples of sequences as useful stimuli for personal, creative activity design thinking, in areas such as the posing of inquiry questions or the use of different media to support inquiry. Looking at someone else's design could function as a prompt or *"reminder to do particular things"* (PFG) or conversely to avoid certain things:

> I think I have learned something from looking at what others have done with LAMS and you also see what to avoid. You see some patterns and think, this is so dull. A critical outlook teaches you what not to do with it (PFG).

2.5.1 Inspiration and adaptation

In the main, participants did not envisage wholesale, 'off the shelf' transfer of LAMS-based activity designs to their own contexts. Instead, they talked about the *"magpie approach"* (PI) of selecting nuggets of good ideas and pointed to the granularity of reuse: *"It's not about reusing whole sessions, but actually elements of sessions, little particular exercises*" (PFG).

> You might look at other [sequences] to have an idea of how others have used it, but the nuts and bolts of 'I'll have one of these exercises followed by this one' I think personally I would use it a bit more intuitively. It would be a bit like looking through a product catalogue but then designing your own kitchen (PFG).

> I think teachers will use [LAMS] in the way teachers always use stuff, which is that they cherry pick. So they'll look at someone else's stuff and they never take the whole thing from beginning to end. They take that and that, you know, and then they often adapt it so you don't even recognise it's been reused (PFG).

Practitioners were concerned that any framework or system for reuse of learning activity (and content) should accommodate and encourage diversity and growth rather than standardisation or stagnation. From this perspective, some reservations were expressed about LAMS as a system that might promote standardisation and mechanisation, and thereby contribute to de-valuing the professionalism inherent in teaching.

2.5.2 Off-the shelf

As noted above, practitioners were generally less interested in 'borrowing' whole sequences than one component of a sequence, or a short series of components. However, less granular, more wholesale approaches to transfer were envisaged, in particular in the context of teaching generic, rather than subject-specific, skills and content. There also was speculation that 'off the shelf' transfer might be attractive and useful for novice e-learning practitioners, or those with little intrinsic interest in e-learning: *"I think it's good for lecturers, if you like, who don't have a great interest and who can actually just drop something in, that's a benefit"* (PFG). The pragmatic consideration of time saved was seen as a benefit, although the convenience of reuse could also be seen as a mechanistic solution - the notion of direct transfer of activity sequences was sometimes associated with superficial professional engagement with teaching whereas 'design from scratch' was associated with deep engagement: *"There is the danger that reuse encourages lazy teaching - you really need to think sessions through yourself, not be handed it on a plate"* (PFG).

2.5.3 Variety

Pilot users identified value in having a variety of different approaches to LAMS activity sequencing to look at, to inform their own design practice:

> "What was useful was being able to just go through quite a lot of different sequences and I didn't necessarily copy any of them because it was just to get ideas of what other people were doing and what was possible with it" (PFG).
>
> I think equally looking at the variety and seeing something's better than others or catering for different people gives the same kind of prompts. But I didn't see any that would be immediately useful because my style [is different] (PFG).

Focus group participants highlighted the danger of gaining a limited view of what was possible with LAMS, depending on the characteristics of the available sequences. They too emphasised the need for access to diverse examples and models of practice. The sequences produced through the DeSILA project were often seen as too short by practitioners attending the reuse workshops: *"The ones we looked at were short, and that made you think, oh, it's limited"* (PFG).

2.5.4 Generic exemplars

The LAMS sequences reviewed by focus group participants (and pilot users) as part of the DeSILA project were all subject-specific designs, in that they provided contextualised illustrations of the use of LAMS for aspects of discipline-based or 'generic skills' inquiry and learning. Focus group participants were asked about the potential value of generic exemplar sequences for IBL in which all subject-content would be stripped away in order to highlight and exemplify the process. These models of practice would then provide 'empty shells' into which different content

could be dropped. While few participants imagined reusing whole such sequences - and there was some indication that generic IBL designs appealed more to practitioners for whom 'generic' delivery frameworks were already a more commonly accepted part of practice - responses were in general enthusiastic: *"It would be nice to have those paradigm good practice examples for you to look at and dream about"* (PFG). Some indicated that they would welcome generic sequences demonstrating scaffolding for particular learning processes, such as reflection or interaction, accompanied by links to relevant theoretical or evaluative literature:

> Just from the point of view of not necessarily having a full awareness of the educational research background that might justify doing a sequence in a certain way. So, you know, there might be sound pedagogical reasons why certain sequences work better than others and rather than doing it by trial and error if somebody said 'look, this sequence works because blah-di-blah and you know, these references explain why it works (PFG).
>
> What we could do with is somebody saying to us 'it has been demonstrated that if you do put this package together using these tools in this order, people pick things up better' (PFG).

The notion of creating departmental LAMS repositories and templates was mooted:

> I like the idea that you could come up with a departmental sort of learning and teaching strategy and say, ok you know for this kind of programme it's worked really well to give a bit of information, get them to do a web search, do this, do that' and put together a template and then let teachers have it and fill the information in from there (PFG).

2.5.5 Sharing and accessing sequences

Participants generally indicated that they would be happy to share LAMS sequences they had produced with others, sometimes seeing this as a means of further developing personal profiles within a disciplinary community. Some reservations were expressed regarding copyright and intellectual property, in particular as regards content embedded into sequences. Some confusion was expressed about whether individual staff or the institution would own designs created in LAMS.

Practitioners wanted access to sequences at different levels of granularity, including whole sequences, 'chunks' of a sequence (smaller sequences of linked activity); individual activity; and, content 'chunks'. They envisaged keyword access by generic pattern, learning method, type of activity, subject area and author (personal knowledge of, and contact with, sequence authors was identified as a strong incentive to view and potentially reuse sequences). Interest was expressed in author/user annotation of sequences. Contextualised user reflection and auto-critique were thought to be more useful than numerical quality ratings:

> That would be a useful thing - that a database would also have some kind of reflection by the person who designed it and whether it went in the way they expected it to or not and why not (PFG).
>
> Sort of like an annotation by users to say, you know, the reason I chose this one is because I wanted to do this and this, or 'the students seemed to like doing this followed by this (PFG).

2.5.6 Reuse in practice

On the one hand, all practitioners in the trial were willing to share their sequences with local and external audiences and interviewees often highlighted reusability as a key benefit of LAMS. Two pilot users took one of the training sequences 'off the shelf' to use in their teaching. On the other hand, only a very small minority looked at other sequences in the local repository or on the LAMS community website before creating their own, with time constraints a common reason given for not doing so. This in effect meant that most had been exposed to only one sequence, viewed during the training workshop, before creating their own: *"I looked at that and that is it, basically. I just kind of thought, this must be how you do it, it's not very good of me really"* (PI). Those who did review other sequences from the LAMS repositories reported benefits for the design of their own sequences: *"It opened up possibilities when I saw what other people had done"* (PI).

2.6 Orchestrating with LAMS

Practitioners envisaged a number of potential uses for LAMS sequences, ranging from in-classroom activities in some cases, to activities intended to supplement face-to-face activities in tutorials, seminars and workshops. Most frequently, the benefits of LAMS activities were perceived in terms of "*extending the classroom"* or *"colonising independent learning hours"* (PI), for example for preparatory or reinforcement exercises, rather than for in-classroom use. Practitioners often expressed reservations about mediating student interaction via LAMS in classroom settings where face-to-face interaction would be a viable alternative.

LAMS was used by all practitioners in the pilot with a view to running their designs in LAMS, rather than as a tool for creating designs to be run in other ways. However, the potential to use LAMS to create designs to run in a VLE was recognised. One sequence referred students to MOLE for a final activity, and another was embedded via a hyperlink into a Moodle environment.

2.6.1 The sequences

Thirteen completed sequences (A - M) were created and/or used by practitioners through the DeSILA project. Table 1 lists them by subject discipline and sequence title; both 'generic skills' sequences and discipline-specific subject sequences were created. Three that ultimately were not offered to students - in one case because low student numbers led the practitioner to change plans and in the others because of technical andr administrative (student registration) problems respectively - are asterisked. Table 1 also indicates student level and numbers, and whether sequences were designed as in-class activities (IC), out-of-class activities (OC) or distance learning activities (D). Most were designed to be used outside the classroom by campus-based students and one was designed to be used by distance learning students on an international programme. The majority were for use by postgraduate students.

Some sequences embedded information-searching activities. No sequences were designed specifically for the purposes of information literacy development, although the potential to do so was recognised.

Table 1: DeSILA Sequences: For Students

Discipline	Sequence Titles	Student Level and Numbers	In/Out/Distance
A. Engineering	Statistics: Matlab	UG Level 1 (20)	IC
B. Education	Exploring E-learning	PG Masters	D
C. Geography	Visual Methods in Research*	PG Masters	OC
D. Information Studies	Group-Work Skills	PG Masters	IC
E. Information Studies	Evaluating Abstracts*	PG Masters	OC
F. Information Studies	Evaluating LAMS Training Guide	PG Masters	OC
G. Information Studies	Exploring E-learning	PG Masters (5)	OC
H. Information Studies	Exploring Blogging Parts 1, 2, 3 (linked)	PG Masters	IC (Part 1) OC (Parts 2, 3)
I. Information Studies	Learning Styles and Communication Preferences*	PG Masters	OC
J. Law	Exploring Intellectual Property	PG Masters (45)	OC
K. Modern Languages	ICT for Language Teaching (Modern Languages)	PG Masters	IC
L. Modern Languages	Reflective Writing and Learning Styles (linked) (French)	UG Level 2 (10)	OC
M. Modern Languages	Translation Revision (Russian)	PG Masters (5)	OC
N. Modern Languages	French for beginners* (French)	UG note this is factored in to the analysis but was not used and so no case available	OC

The DeSILA project also produced three sequences for demonstration (training) purposes (1 - T3) as listed in Table 2.

Table 2 DeSILA Sequences: For Practitioners

Demonstration/Training Sequences
T1. Exploring E-Learning
T2. Music in Everyday Life
T3. Problem-Based Learning Cycle

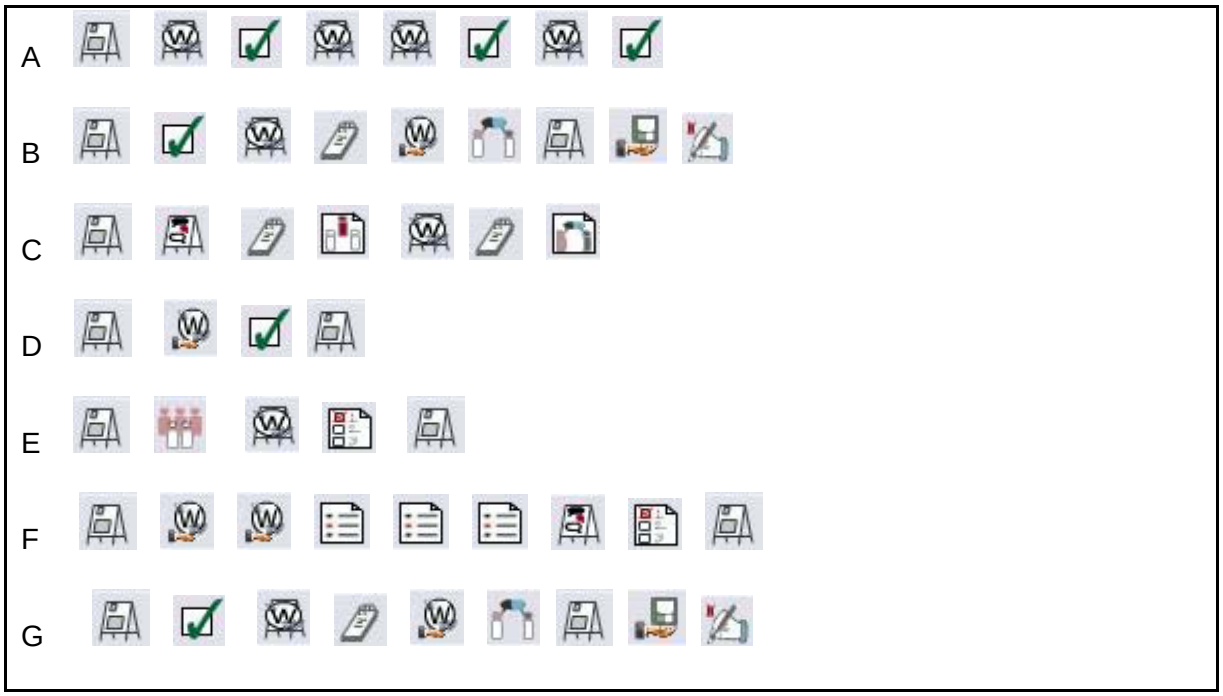
These sequences were designed to introduce potential participants in the DeSILA project LAMS and a variety of activity tools offered by the system. One sequence (T2) was designed to demonstrate the use of LAMS in a specific discipline (Music), specifically for practitioners from that discipline. These demonstration sequences also were intended to suggest a variety of IBL-style approaches to designing with LAMS.

A number of further sequences were created or part-created by practitioners solely as part of workshop or individual experimentation, or by students as part of coursework. These are not included in this analysis.

Two sequences (B and G) reused a demonstration/training sequence (T1) that adapted a sequence created in the context of a previous JISC evaluation project (Masterman and Lee, 2005). These two sequences, reused without adaptation to the T1 activity flow, were adopted on modules for which the subject focus (e-learning) and purpose (demonstration/training) were themselves of direct relevance and the sequence content could therefore be maintained. None of the other sequences produced through the project directly reused this, or any other, demonstration/training sequence. This seems broadly consistent with practitioners' perspectives on reuse as described earlier, in that 'wholesale' reuse of sequences without adaptation of the activity flow or content was not generally envisaged as desirable or likely. Nevertheless, it is worth noting that in a very small sample of sequences, two instances of reuse with minimal adaptation were observed. This perhaps suggests that reuse without adaptation might prove more feasible in practice, at least where subject content is reproducible, than is sometimes envisaged in principle.

Figure 4 illustrates the flow of LAMS activities within each sequence, the shortest of which comprises just three activities and the longest, fifteen. Novice users of LAMS were more willing to experiment initially with creating and implementing small-scale sequences than sequences that might extend over a long inquiry process and period of time. Several used the tool to broadly replicate designs they had already used in face-to-face teaching, while others had new ideas sparked for small-scale activities. Several pilot users reported in post-implementation interviews that using LAMS had helped them to develop new ideas or approaches to IBL. This was confirmed by three out of the five pilot users who completed feedback questionnaires. In two cases LAMS was 'handed over' to students as designers of learning; these were in courses with an education subject focus in which students were learning the practice of design for learning.

Figure 4: Flow of LAMS activities



Key: LAMS tools (version 1)

Chat Chat & Scribe Chat & Scribe + Notebook Forum

Grouping Multiple Choice Notebook Noticeboard

Q & A Q & A + Notebook Resources + Forum Share Resources

Submit Files Survey Voting Voting + Notebook

It is perhaps not surprising that novice users of the system often used a relatively limited palette of activities for their initial sequences. As seen in Table 3, the most frequently used activities across all sequences were the Noticeboard (37 instances), Resources+Forum (21 instances) and Share Resources (16 instances). A number of activities were little used. The possibility of designating activities as optional was not used.

Table 3: LAMS activities

Activity	No. of uses	Activity	No. of uses
Chat	4	Q&A	4
Chat&Scribe	4	Q&A+Notebook	2
Chat&Scribe+Notebook	1	Resources+Forum	21
Forum	5	Share Resources	16
Grouping	1	Submit Files	5
Multiple Choice	8	Survey	9
Notebook	5	Voting	2
Noticeboard	37	Voting+Notebook	2

The Noticeboard tool was used to introduce all the sequences and, in several cases, to provide further instructions or subject content at later stages. The popularity of the Resources+Forum tool reflects a strong emphasis in several sequences on student discussion of, or exchange of responses to, resources provided by tutors. The Share Resources tool was used in some cases to facilitate students' own information-seeking and resource selection, and in others to facilitate exchange of students' work. Although several practitioners envisaged grouping students in small sets, the random grouping functionality proved unattractive (and technically unwieldy) and in practice was experimented with only twice. There was little use of synchronous chat, but the Resources+Forum tool was used in some synchronous settings. There was some, but relatively little, use of reflection tools and an assessment tool (Survey) was used to collect module feedback rather than for assessment of students' subject understanding.

LAMS did not appear to be intrinsically generative of student-led approaches to IBL, and the characteristics of these practitioners' use of the tool seem to confirm its pedagogical and design affordances as discussed earlier. The sequences do not reflect the design characteristics of strongly student-led, open-ended, or extended approaches to IBL. None ask students to identify their own inquiry questions and work together to develop lines of inquiry. Neither do any adopt a problem-based learning protocol in which students would, typically, be offered a complex scenario to explore collaboratively, including by means of independent information-gathering and analysis. Instead, in inviting critical, 'inquiring' responses to given resources, asking students to find additional resources to share with others or to respond reflectively to questions posed by the tutor, the sequences generally are conceived as small-scale initiatives in more teacher-led approaches to IBL.

2.6.2 Observations

Three in-classroom pilots were observed, all of which took place in PC labs with traditional seating arrangements (students in rows at individual workstations). Observations revealed some patterns in student interaction with the system. Often, students did not read initial instructions before moving rapidly on, or at times had difficulties in understanding instructions. The importance of providing clear initial instructions (and encouraging students to attend to these) was therefore highlighted. One practitioner had created an introductory training tutorial (using Powerpoint and overhead projector) and others identified the potential value of a generic "how to use LAMS" sequence for students. Observations also showed that students were not

always fully 'on task' when moving through the LAMS sequences, in that they often were simultaneously engaged in other online activities (email, websites).

2.6.3 Practitioner satisfaction

Levels of practitioner satisfaction with using LAMS were mixed. A minority of pilot users had very negative experiences of technical problems or felt dissatisfied with the quality of their own sequences. Practitioners were cautious about ascribing particular effects to the tool given the small-scale experiments of the pilots:

> We did work through the session in class and I assume the session probably did work okay. I am not sure LAMS contributed much to that. I mean in some sense […] we did not need something as sophisticated perhaps as LAMS, I didn't see any impact really on the engagement of the student. But I don't think trying it out in one session is a fair test of it, is it? (PI)

However, most reported generally positive perceptions of their experimentation with LAMS in terms of impact on the student experience and achievement of pedagogical objectives, notwithstanding technical hitches in some cases. Some practitioners highlighted the success of peer interactions and their appreciation of the easy student tracking and monitoring function. Some compared the experience favourably with face-to-face initiatives. For example: *"In general I was pleased with the result. I thought it was better than the paper-based result"* (PI).

> I would say they [practitioner objectives] have been achieved if we look at the outcomes at the end of the programme. As far as I can tell at the moment the students are feeling comfortable with [what was covered via LAMS] (PI).

> The general feeling we got was that [students] preferred LAMS [over WebCT]. They preferred having to work their way through and got somewhere in the end and some of them are not very good at reflecting on what they've done or achieved but the way it's set out for them it makes them do it or is a prompt for them to do it […] I think there is an element of coercion to discussion areas but I find it a lot better than my usual method of saying there's a discussion board on WebCT and I'm going to pester you every time I see you until you've actually contributed rather than them working their way through the exercise (PFG).

2.7 Student perspectives

Students' perspectives on LAMS were reported in feedback on participation in specific sequences and following viewing of sequences during focus group discussions. Both positive and negative perspectives often paralleled those of academic staff.

A total of 81 students responded to follow-up questionnaires after using LAMS sequences in modules (Appendix 5 shows quantitative results for each sequence). Thirty-six were undergraduates (4 sequences) and 45 were postgraduates (1 sequence). Responses from both undergraduate and postgraduate groups were mixed, as were responses to the same sequences. Therefore the data do not suggest that differences in perspective were explained by either student level or the characteristics of specific sequences.

2.7.1 Questionnaire feedback

1. In all five cases, all or most students *agreed that they had enjoyed the LAMS activity*, but in three cases some students disagreed, sometimes strongly.

2. In all five cases, most students *agreed that they had found the LAMS activity stimulating and useful*; in one case, this was a small minority.

3. In all five cases, most students *agreed that they had found the LAMS activity effective in helping them to learn about their subject*; in two cases, some students disagreed.

4. For all five sequences, most or all students *agreed that the LAMS activity had involved them in a new way of learning*; in two cases some students disagreed.

5. In three cases, most students *agreed that the LAMS activity had helped them to carry out some useful research/exploration*; in one case, some students disagreed.

6. In all five cases, most students *disagreed that they had found LAMS difficult to use,* although some students agreed in all cases.

7. In two cases, most students *agreed that they had found LAMS flexible to use*; in two cases most disagreed.

8. In one case most students *agreed that they had found the LAMS interface attractive*; in four cases, some students disagreed.

9. In three cases, most students *disagreed that it had taken them too long to learn how to use LAMS*; however, in all cases some students agreed that it had.

10. In three cases, most students *agreed that they would recommend that the module continue to use LAMS* (one instance being a hypothetical recommendation by focus group students). For one sequence, more students agreed than disagreed but they were not a majority and there was some strong disagreement.

11. In four cases, most or some students *agreed that they had found the LAMS system too restrictive*. However, in one case, all students disagreed.

12. In four cases, most students *agreed that they would like to use LAMS again*. In the other case, an equal number of students agreed and disagreed.

13. In four cases, most students *agreed that using LAMS was quite different from using WebCT*; in the other case, most students were undecided.

14. In three cases, most or a large minority of students *agreed that they preferred WebCT to LAMS*; in four cases a small minority of students disagreed.

These data, although limited in terms of the number of LAMS initiatives and students involved, nevertheless shed some useful light on students' perspectives and experiences. There are some clear indications of positive student engagement with LAMS. Students report having enjoyed the LAMS activities in which they participated, and perceive beneficial impacts on their learning. Many feel that in using LAMS they carried out some useful research. Most consider that the LAMS

activity engaged them in a new approach to learning and that using LAMS is quite different from using WebCT. Most report learning to use LAMS quickly and that it is easy to use. While LAMS is not preferred to WebCT, many recommend continued use of LAMS in the pedagogical context in which they have encountered it, and most indicate that they would like to use LAMS again.

There are also some widely differing responses in these data. One sequence in particular elicited both strongly positive and strongly negative responses on a number of scales. It is also clear that individual students' experiences and perspectives varied across the sample as a whole, including on the subject of the attractiveness of the LAMS interface. There is some ambiguity on the subject of the flexibility and/or restrictiveness of LAMS from the student perspective (as indicated in the apparent mismatch of responses to questions 7 and 11 on the questionnaire). However, while some students indicate a strong perception of LAMS as inflexible and restrictive, others - including all students on one module - did not experience it in this way. It is not clear from our data whether particular features of sequence design or context may explain these differences, over and above questions of system navigation. However, the sequence in which LAMS was universally experienced as 'not restrictive' was perhaps intrinsically more open in design than others, in being a very simple, short sequence based solely on a series of 'noticeboard' instructions followed by a 'forum'.

These quantitative findings are confirmed and elaborated upon in students' responses to a number of open-ended questions on the feedback questionnaires. Some engineering students, in particular, indicate appreciation of the structured and 'logical' nature of the LAMS sequence they experienced (*"helps you go through a topic in a structured way"*). Modern languages students highlight the access they gained to useful resources, the way in which sharing of information and discussion between students was facilitated, the value of the private notepad function, the ease of manipulation of digital files, and impact on learning (*"LAMS enabled me to consider approaches to* [the subject] *in a different way to previous tasks"*, *"you could see other people's opinions which helped you form your own"*). Law students comment positively on the development of their research understanding and skills (*"conducting proper online research"*), the stimulating variety of activities and use of multimedia resources, and the encouragement to actually engage with the task (*"if it was not for LAMS I wouldn't have looked at the searches"*). These students also comment on the novelty and interactivity of the activities, and their impact on engagement and learning (*"interesting information, linked to learning, made me think and concentrate, I found it stimulating"*; *"allowed to carry out research and it was a different sort of exercise than we normally do"*; *"much more interactive than using WebCT, it kept me interested throughout")*.

On the less positive side, students complain of inflexible navigation, in particular the *"frustrating"* lack of opportunity to move backwards in a sequence to view previous activities (*"very strict and restrictive - can't move on to the next stage until first one is completed, unable to move back through stages/change work"*); the *"unattractive"* and *"unclear"* interface; the *"fiddly"* technical procedures. In some cases students experienced technical glitches such as slow system speed and problems accessing specific multimedia resources. In terms of pedagogical design, some students complain of lack of clarity in teachers' instructions about the use of LAMS and specific tasks. In contrast to the positive perspectives highlighted above, some of the postgraduate Law students did not perceive any added value in the use of LAMS (*"the exercise could have been set without the need of the LAMS system"*), and complained of *"long-windedness"* and the over-structured nature of the process ("*the extent of the tasks - there were too many so it got a bit boring"; "a lot of checking of*

boxes"; "no real educational value - took too long"; "this system has considerably lengthened a simple research exercise"'; "none of the activities were particularly useful. Everyone keeps relating things to how they will be done in practice, well in practice we won't have a computer programme guiding us through it, it would have been more beneficial to figure things out for ourselves").

2.7.2 Interviews and focus groups

Similar themes emerged from one-to-one interviews with the four students (3 postgraduates and 1 undergraduate) who agreed to be interviewed about their experiences of LAMS, and from the five students who attended the focus group. On the positive side, some students saw LAMS as compatible with IBL and appreciated the way in which it could stimulate independent engagement:

> I think it kind of encourages, like, independent thinking. Rather than just giving you the answer it is really nice how they have kind of left it really open because I don't get that a lot, it's just taught, like we're kind of given one aspect and that's it, we're just given a lecture and this is actually encouraging you to kind of make your own decisions (SI).

> It's somehow better than WebCT […] We don't really want to just give students lectures. We want the students to learn things by themselves. It's called inquiry-based learning I think and this software is quite good. Especially you can actually follow the process (SFG).

As in the comment above, the forwards-linearity of the guided process was explicitly welcomed by some students. In-classroom use of online discussion was highlighted as useful, and students welcomed the variety of multimedia resources embedded into some LAMS sequences. They frequently compared LAMS favourably with MOLE (WebCT), which they had tended to experience principally as a repository for administrative and subject information. LAMS was experienced as *"more dynamic"* in contrast with the *"static"* MOLE environment.

> It is good to have interaction with other students, not like WebCT which just provides notes and materials. Although WebCT still has some discussion boards, the teachers fail to use this function. In LAMS the main objective is to provide an activity environment. So I like this format of learning (SFG).

> I look at WebCT as more like an admin sort of thing where you find out things, where you can find the timetable and stuff like that […] I wouldn't call it a learning tool exactly, whereas [LAMS] is more of a learning tool and you'd use it more for, yeah, WebCT is a different environment (SFG).

One student felt that participation in a LAMS sequence had empowered international students to express their opinions more easily:

> There were a lot of Chinese students in [this] course. When we were involved in discussion (face to face) during the classes, a few Chinese students can speak but when we are involved in the [LAMS] discussion forum, I think most of them take part in this […] The teaching style here is mainly to inspire students, so they will encourage students to discuss something. In our country, the main teaching style involves the teacher talking. And the students are just taking notes and remembering. The use of discussion boards really suits [international] students (SI).

On the less positive side, interviewees emphasised again the frustration of not being able to return to activities once a sequence had been viewed in its entirety:

> [At the start] I didn't answer any of the questions, I just clicked next, next, next and I reached right to the end and I had not done anything and I couldn't go back to it. It was really annoying (SI).

Students emphasised their desire to gain an overview of the learning, whereas *"you went into LAMS not knowing what was coming next"*. The forwards-linearity of the process was not appreciated by all:

> I'm not a very linear person. I tend to start in the middle and then go to the end and then go back to the beginning again […] I'm not linear. I'm not sure if on the whole people learn in a linear fashion (SFG).

Some students had experienced LAMS as, rather than facilitating independence, strongly teacher-controlled with little scope for their own autonomy and ownership of the learning experience. They had reservations about this: *"unfortunately we have to learning [the tutor's way] not our way, it is like structuring everyone to learn at the same pace and in the same manner"*.

> Sometimes I find it restrictive because if I go to a discussion board, I have to discuss, I can not read other articles. Maybe I want to read articles or maybe I want to do other things, I have to just force myself to discuss (SI).

> I think the interactivity is done within a kind of framework, isn't it? The tutor will say when they're making their LAMS sketch or whatever, you know, you're going to be interactive, but you're going to be interactive in what I tell you to be interactive in. Do you see what I mean? (SI)

Another student pointed out that being 'forced' to contribute to a discussion board before moving on to a subsequent activity did not guarantee quality of engagement: *"I didn't actually use the discussion board. Well, I think I had to post something up because [the tutor] insisted on it but apart from that, no"* (SI).

Some students were concerned at the idea of LAMS used in classroom settings, seeing it as more useful for additional independent activities done outside the classroom: *"I wouldn't be happy about doing it actually at seminars or in a class"* (SFG).

The students had suggestions about ways in which the LAMS interface could be improved in terms of guidance on navigation, search capability and connection with email to notify students when fellow students log on. They also wanted to be able to customise the interface, for example with font colour and the ability to move objects around the screen.

2.8 Technical support and issues

LAMS version 1 was set up on a LAMS International external hosting service from 1st July 2006, with the expectation of a move across to LAMS version 2 in due course. In the light of projected version 2 release dates, it was anticipated that migration would be possible from the middle of Semester 1 of the academic year 2006-7 (October to December). However, the project planned to continue using version 1 for Semester 1 implementations, in order to avoid potential confusion for new users.

The intention was to introduce version 2 in time to enable familiarisation and training in time for Semester 2 implementations (February to May). Delays with access to version 2 initially led to planned migration in mid-January 2007; further delays and on-going technical issues at the hosted service end were resolved only towards the end of March 2007. This meant that while version 2 offered a number of enhancements, DeSILA was unable to evaluate these through pilot implementations as originally hoped.

A LAMS Technical Support Officer was seconded part-time from a primarily WebCT support role in an academic department. Technical support was provided to users during introductory LAMS training workshops and delivered as follow-up on a one-to-one basis as practitioners developed and implemented sequences. A help-line approach was adopted, with technical advice and troubleshooting made available via email, telephone and, where possible, in person. Feedback indicated that users would have liked to see an example of a LAMS sequence embedded into MOLE.

Evaluative practitioner feedback consistently indicated high levels of satisfaction amongst pilot users with the technical support that was provided, as confirmed by all of the five respondents to feedback questionnaires. Basic technical training documents were created, although the anticipated move to LAMS version 2 made specific support for version 1 less useful. Pilot users also were encouraged to look beyond DeSILA resources to the LAMS International Community website and fora, for both technical and pedagogical information. Feedback indicated that few did so.

The aim in establishing support resources and systems for LAMS was to foster the development of a support community, based on interaction amongst users as well as with support staff. A mailing list for communication with all those with interests in the DeSILA project was established at the outset, as was a user community forum on the University's portal system, MUSE (My University of Sheffield Environment). A website was established with links to a database-driven knowledge base to which staff using LAMS could post queries and questions, and to which queries arising from forum-based discussions could be transferred. Some queries and answers were saved to build up an online bank of FAQs and a glossary. However, there was little user engagement with the systems initially set up and the project subsequently experimented with a wiki, with the aim of providing a one-stop focal point for showcasing LAMS-based activity and for both technical and pedagogical support/collaboration. While a few pilot users made some contributions to the wiki, there was relatively little engagement during the life of the project. Some practitioner feedback suggested that more active facilitation of user interaction via the wiki would have been welcomed.

LAMS was perceived by pilot practitioner users to be a generally user-friendly tool, although some technical problems and issues arose, including some that were especially disruptive. Some planned implementations could not go ahead because of *ad hoc* technical difficulties arising at the system end. Given that most of the technical problems and limitations that arose applied to LAMS version 1 and server hosting problems they are not recorded here; all problems were reported to LAMS International and the LAMS User Community and most were resolved.

Pilot users fed back suggestions for enhancements to the features offered by LAMS and these were communicated to LAMS developers at LAMS International. Suggestions included: 'branching' options to enable design of different learner

pathways through sequences; enhanced student grouping functionality; collaborative authoring and team-teaching capability.

2.9 Pedagogical support and issues

The pedagogical support for LAMS sequences was organised along similar lines to that provided as part of the work of CILASS more generally. A Learning Development and Research Associate from CILASS took on the role of Pedagogical Support Officer for DeSILA, creating custom-made training sequences intended to illustrate the use of LAMS in an IBL context, facilitating introductory workshops, and offering one-to-one guidance to pilot users as they developed their sequences. On-going feedback about the quality of this support was highly positive, as was feedback from the five respondents to the feedback questionnaire. The following paragraphs highlight observations stemming from the experience of providing pedagogical support for LAMS use in the IBL context.

It was observed that practitioners often approached LAMS initially as a 'teaching' tool rather than as a 'design' tool; in other words with a strong focus on what it could offer students in the process of orchestration rather than what it could offer the practitioner in the phase of creating designs. Some practitioners commented that they were unfamiliar with the concept (or at least, the terminology) of 'design for learning' and it was noted that the conversations around LAMS were useful in making the concept explicit. It was noted that it often was necessary to facilitate thinking 'away from the tool', to prevent staff being restricted by initial perceptions of its possibilities. Limited understanding of the technology occasionally led to a 'can't-do it with LAMS' assumption which was resolved through discussions and modifications of original design ideas. Practitioners sometimes did not immediately recognise potential for sequences to support more extended, rather than very short, learning experiences, and did not identify useful possibilities for the collaborative tools in a face-to-face classroom environment.

A particular pedagogical problem emerged from an in-built technical characteristic of the system as regards web-page referencing. Hyperlinks from LAMS led to display of a web page's main window without the URL bar, resulting in students being unaware of the web address of the resource to which they had been led. Onwards navigation also led to display without web address, requiring students to have a level of technical knowledge to enable them to identify and share subsequent addresses. This meant that designers needed to include URLs in their explanatory text, and students needed to be encouraged to adopt a similar approach and follow their own links in a new browser window.

Most pilot sequences were developed with some pedagogical support input. Most, although not all, pilot users attended an introductory workshop, where the custom-made sequences proved invaluable in generating critical and reflective discussion on both IBL and the pedagogical uses of specific LAMS tools and types of activity sequence. It became clear that even those practitioners who attended an introductory workshop preferred to meet with the Support Officer afterwards to discuss specific ideas; one-to-one support emerged as a vital component of the project. This raises issues regarding the scalability of the support model, and the potential of alternative strategies such as drop-in sessions. Practitioners sometimes asked if there was any prospect of installing pedagogical guidance within the LAMS system itself.

Whether or not embedded specifically into the system, there would appear to be value in the development of a pedagogic planning resource to support IBL uses of LAMS as a specific tool. We have already noted issues relating to 'linearity' in design for IBL and any planning resource would need to address this, alongside a range of other issues. Based on the experience of the DeSILA project, and on the CILASS design framework for IBL (Figure 1), 'headline' topics of a resource of this kind could be as indicated in Figure 5. We envisage a resource in which generic, exemplar uses of LAMS tools for particular purposes within an IBL design would be given throughout, with links to sequences that illustrate such activities in context. For example, a small-scale information literacy development ('process support') task embedded into a larger-scale inquiry might use the 'Share Resources/Forum' tool to invite students to a) find relevant information via the web, b) identify its URL and provide evaluative commentary on its authority and usefulness, c) review and discuss each other's resources from an evaluative perspective. A pedagogic planner would briefly describe such an activity and then link to an example of it within a sequence.

Figure 5: Towards a LAMS Pedagogic Planning Resource for IBL

1. Overview of IBL design principles

2. Designing IBL with LAMS:
   - Student- and staff-led inquiries (questions, problems, scenarios)
   - Linear and non-linear inquiry processes
   - 'Process support' tasks/materials (e.g. reflection, information literacy)
   - Embedding access to multimedia information resources
   - Peer and tutor interaction, collaboration, facilitation, feedback
   - Face-to-face and distance modes, and moving between them
   - Connecting with other technologies for learning (e.g. VLE, social software)
   - Self, peer and tutor-led assessment

3. IBL design checklist

In retrospective feedback about support needs, a number of practitioners indicated that in the future they would welcome further 'case study' driven workshops which would offer opportunities for interaction with academic users of LAMS who had created and run their own sequences. Their aim was to gain contextualised exploration of pedagogical motivations and experiences. For example:

> I am hoping that quite soon we can see some examples of our practice in the University. Scenarios of use in LAMS, I would like to see some more examples quite soon. Some case studies, not a lot a details at this stage but just to see how people are approaching it (PI).

> I would like to see something successful. Something that someone has done. You have advertised saying come and see, to sort of see in theory this is what you can do, but see something that has worked, yeah. That would be very useful (PI).

Others suggested a role for more in-depth introductory courses:

> A course on how to use it effectively in teaching as opposed to how to mechanically use it will be very useful, because it is easy to use mechanically (PI).

2.10 Institutional issues and support

Interviews with pilot users indicated that experiences of LAMS were often sufficiently positive to lead them to envisage using the system beyond the pilot. This was confirmed in the five responses to the feedback questionnaire, in which three pilot users recommended that LAMS should be rolled out to the wider University; one was unsure; and, one considered that it should not be rolled out. Three said that they would personally use LAMS again if it was adopted by the institution, and two said 'maybe'.

However, pilot users and participants in focus groups emphasised that their continued use of LAMS would depend, first, on institutional-level support for its use in the long term and, second, on integration with MOLE. Many practitioners who encountered LAMS through the project expressed strong reservations about expending time and effort on a tool that might not ultimately be adopted by the University; we believe that this consideration was a key constraint on the DeSILA project's ability to recruit pilot users and to encourage more extensive experimentation with the tool. Typical user comments were: *"If I thought we were going to be using it all the time then I could have used it much more throughout the whole course"* (PI) and:

> From the University's point of view we need to know if LAMS has a long term future before I will want to use it more seriously […]. Providing there is some commitment from the University to maintain it, I will consider using it (PI).

2.10.1 LAMS integration with MOLE (WebCT)

The University experienced problems with ICT infrastructure, impacting on the institutional portal, and WebCT Vista, beginning in August 2006. It was believed that these may have impacted negatively on engagement with, and perceptions of, DeSILA and LAMS during the academic year 2006-7, as experience indicates that technical problems with specific technologies and aspects of ICT infrastructure across institutions can generate a negative impression of technology in general amongst users.

The DeSILA project served to highlight the dominance of the institutional VLE on the University's e-learning landscape, both in terms of its role in shaping practitioners' (and students') conceptualisations of e-learning and in meeting pragmatic requirements for standardised administrative processes and guaranteed, long-term support for use. While seen as an essential platform for providing students with online access to administrative and subject content, the VLE was not universally perceived by LAMS pilot users as an easy tool to use - particularly in relation to the design and orchestration of learning activities - or as sufficiently flexible or rich in functionality and features to meet all their needs. However, as one commented:

> We will always use WebCT because it is supported by the University and what is more important than the perfect VLE is having something that works and is stable and the students can be registered in it and so on. So really we have no choice but to use WebCT. If the University uses LAMS we will use LAMS (PI).

With WebCT as the frame of reference for e-learning within the University (albeit with interest increasing in Web 2.0 tools), LAMS was repeatedly compared to it by those involved in the DeSILA project and was sometimes perceived, at least in the first instance, as an alternative VLE. The question of what LAMS could offer, either over and above the VLE or as a supplement or add-on to it, therefore was rapidly identified as critical to practitioner acceptance of the tool in our institutional context. The different, activity-design functionality of LAMS was not always immediately evident to practitioners, although generally was recognised with closer acquaintance. In most cases, practitioners did not envisage using LAMS as a replacement for, or alternative to, the VLE but as an enhancement to it. As one experienced user of MOLE put it, *"we need a range of tools in the toolkit"* (PI).

Seamless integration with the institutional VLE (WebCT Vista) usually was perceived as essential by practitioners who used or viewed LAMS during the project. They envisaged students moving back and forth between a LAMS sequence and elements of VLE functionality (e.g. discussion board) and resources, using multiple windows. Partial integration was an option during the pilot, in the form of hyperlink embedded into a MOLE environment; however, this did not obviate the need for a separate login and password, and as one practitioner said *"it gets really clumsy because you have got two environments"* (PI). Others commented that, *"if it's an add-on to WebCT, probably I will be more inclined to use it* (PI); *"it will be a useful facility to have in WebCT, to be able to be in WebCT and design a sequence will be a natural thing to do"* (PI). Some practitioner feedback indicated that the status of LAMS as a closed system in the institutional context militated against its perceived value as a generic design for learning tool: that is, a tool for designing sequences of activity that might take place outside of LAMS itself.

2.11 Framework for sharing and reuse of IBL designs

In addition to focusing specifically on aspects of the sharing and reuse of LAMS-based designs, the DeSILA project set out to explore broader learning design sharing and reuse requirements for IBL within a community of practice context. As a highly flexible pedagogy grounded in the research and scholarly practices of different disciplines, IBL is not based on any single process model or pattern with steps that must be followed. Nevertheless, certain process models, such as those derived from problem-based or experiential learning, may have value in informing specific IBL designs and we do identify a role for generic exemplar designs in the mix of design for learning support.

However, focus-group and other consultation with practitioners involved in CETL-related IBL development initiatives indicated that above all they wanted concrete, succinct case examples of practice that would illustrate what IBL processes can 'look like' in different disciplinary and educational contexts, and provide evidence of the impact that different designs have had on students' learning experiences. Except in cases of teaching 'generic' subjects or skills, they rarely looked for automated machine-runnability or wholesale transfer of designs to their own practice, but wanted inspiration for creative design in their own contexts. Our emphasis therefore thus far has been on exploring ways of facilitating the sharing of contextualised and annotated representations of IBL processes, with a view to reuse of discrete design elements (activities, or sequences of activities). Informed by feedback from CILASS IBL development project-leaders, DeSILA participants and relevant literature (e.g. Falconer et al, 2007) we adopted the following key principles in developing an 'IBL design and facilitation' case architecture:

- Cases should be easily accessible via the web, to both internal (institutional) and external audiences;

- They should be searchable from different perspectives and include a filter (summary) to allow rapid diagnosis of likely interest;

- They should offer both structured (template-based) and unstructured representation of learning designs and associated information;

- Designs should be contextualised in terms of educational rationale, conditions of instantiation, outcomes, lessons learned;

- They should offer some insight into the 'lived experience' of the learning and teaching activity from both students' and teachers' perspectives;

- Opportunity for peer comment and dialogue should be embedded into the online environment for accessing the cases;

- Where possible, there should be access at different levels of granularity, e.g. the ability to 'drill down' from whole IBL module overviews to further detail on specific activity components;

- Framed as 'community resources', the design cases should be usable as foci for dialogue and reflection in face-to-face educational development settings;

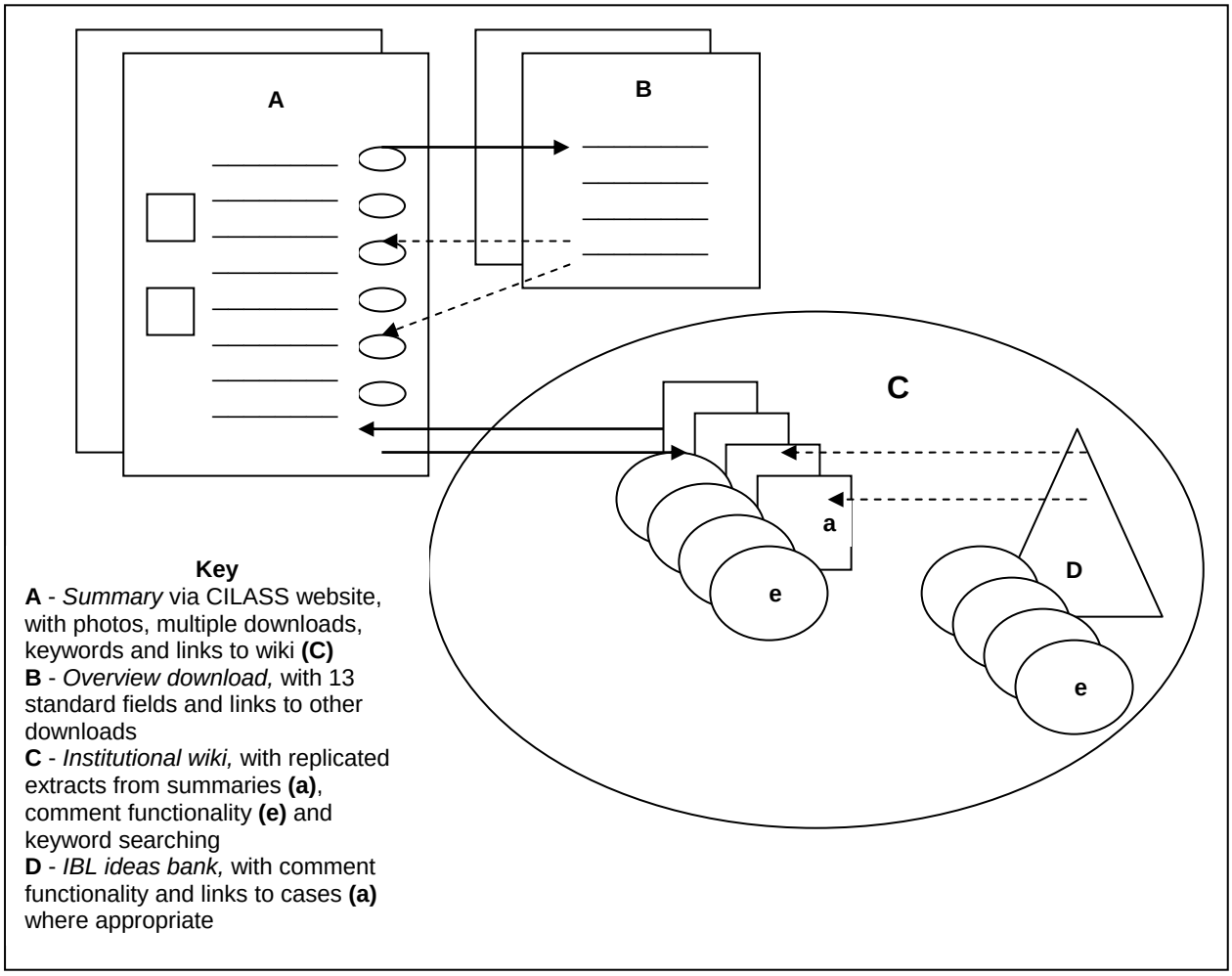
- They should be amenable to easy up-dating, by either academic or educational development staff.

At the time of writing, the CILASS IBL case architecture and format have been established and work is in progress on developing case representations with project leaders of CETL-funded development initiatives, in a phased process (see www.shef.ac.uk/cilass). CILASS cases are outward-facing - directly accessible to people external to the University and linked-to from HEA Subject Centres and other CETLs - and inward-facing to members of the University. The two-level architecture consists of a web page per case within the CILASS website, plus a series of additional materials in the form of downloads from a side-bar. The website entry-point frames the CETL's cases principally in terms of pedagogical approach (IBL) and enables cases to be searched by discipline, a keyword 'tag cloud' or a google-style search feature.

Each web page also contains a link to the University's recently established Teaching and Learning Case Studies wiki environment. This offers the CETL a means of integration of its cases with the resources of the wider institution, as well as keyword searching functionality and opportunity for discussion and comment around its cases. The wiki also includes a section framed as an 'IBL ideas bank', intended to provide a focal point for sharing of 'small-scale' IBL activity designs and ideas outside of the context of CETL-funded project initiatives, which is the basis for the creation of the more extensive cases.

Each case is represented via a short page within a CILASS section of the wiki, which extracts from the 'first level' page on the CILASS website and links back to it. Figure 6 provides a visual representation of this architecture, which is intended to maximise accessibility to the cases from alternative entry-points and to maintain CETL 'branding' while ensuring integration within the wider institutional context.

Figure 6: CILASS 'IBL design' case architecture



The first-level access point via the CILASS website (**A** in Figure 6 above) provides a short, non-standardised, informal overview of the case, written by the project leader in a style intended to engage. One or two illustrative photographs, where possible, are included.

The web page (A) also provides up to five keywords highlighting key themes in the case, project leaders' contact details and, as noted above, a link to the University's learning and teaching case studies wiki. The aim is to provide a minimum of information that will nevertheless allow readers to identify the potential interest and relevance of the case to their own practice, enable them to follow up project leaders informally off-line, or comment on the case on-line via the wiki. The wiki allows for searching across CILASS cases and all other institutional cases as one dataset, via a wide range of search terms. This means that end-users are not constrained to accessing CILASS cases by pedagogical approach (IBL) but also retrieve them through searches on other search terms, including those that relate to learning and teaching objectives.

All cases include among the downloads a short 'design for learning overview', (**B** above) using a standard template with a structure that reflects the design framework for inquiry-based learning used by the CETL in its educational development work,

and that also includes fields for evaluative and reflective material. Other downloads include, depending on availability and relevance: student and staff comment via podcasts; inquiry task guidelines and resource materials; materials generated through learning and teaching activities, including students' work; screenshots from the university's virtual learning environment or other digital environments and tools; photographs or videoclips of learning and teaching in action; materials produced for other modes of project dissemination (e.g. conference presentations and journal articles). Project leaders are encouraged to contribute relevant screenshots from the University's VLE or other digital environments and tools, and photographs or videoclips of learning and teaching in action. CILASS collaboratory learning and teaching spaces are equipped with audio- and video-recording facilities so we hope that short 'in action' recordings will be made available. These collections of downloads are conceived as portfolios that offer insight into the lived experience of cases as well as materials that will be amenable to re-purposing or reuse in other contexts.

The standardised 'learning design and facilitation' template includes fields as indicated in Figure 7 below with hyperlinks, as appropriate, to other downloadable materials. In creating it we consulted end-users and cross-referenced with other templates (including the JISC e-Learning Practice case template). The template is not intended to achieve comprehensive representation of each case but to capture key elements of IBL pedagogy and our specific community context. We anticipate that completed templates will be useful not only in the context of the fuller case portfolios of which they form part but also as stand-alone elements amenable to collective dissemination in other formats (e.g., in good practice guides).

Figure 7: Case Overview Template Fields

CILASS Inquiry-based Learning Design and Facilitation
Case Overview Template Fields

1. The students and the curriculum
2. The learning and teaching aims
3. The inquiry/inquiries
4. The assessment
5. The information resources and strategies
6. The tutoring/facilitation approach
7. The 'process support'
8. The learning technology
9. The learning spaces
10. What really worked
11. Things to build on and/or do differently next time around
12. Advice to others
13. Further comments

For the purposes of the DeSILA project, as noted, a project website was established with a wiki providing access to technical support information on the use of LAMS and 'top level' screen captures illustrating sequences produced plus password-protected access to the fuller representations via the LAMS server (the fact that LAMS is a closed system is necessarily something of a barrier to easy access to the sequences as runnable designs). With a view to providing 'one-stop' access to IBL learning design cases at the University, the intention is to integrate the LAMS designs into the case architecture and format described above.

3. Summary and discussion

The following sections summarise and discuss the project's key findings.

3.1 Design for IBL

Practitioners who participated in the evaluation described differing perspectives on, and approaches to, IBL. Principles associated with learner autonomy, responsibility, reflexivity and ownership were widely espoused, although the amount of structure and control that practitioners envisaged embedding into IBL activities could vary considerably. Some perspectives reflected more strongly 'teacher-led' IBL pedagogies than others. Individual practitioners indicated that they would adopt different approaches in different educational situations, and sometimes that they aimed to develop their IBL practice in more strongly student-led directions.

3.1.1 Dimensions of design

Practitioners often were unfamiliar with the terminology of 'design for learning' and sometimes indicated that the concept and practice of design tended to be implicit, rather than explicit, in their practice as teachers. The ways in which they described their approaches to design could be differentiated along two key dimensions. The first of these was a 'content/process' dimension. In some cases, practitioners indicated that considerations of subject-matter would be their point of departure in creating a design, whereas in others they highlighted considerations relating to the process of students' learning experiences as the point of departure. They tended to associate design for IBL, broadly, with process-oriented approaches although some described an integrated perspective in which a focus on process was inseparably connected to a focus on content.

The second dimension was a 'generic/personal' dimension. Some practitioners described designing for learning largely in terms of drawing on their own personal conceptualisations of the processes or subject matter with which students were to engage. Others described drawing on different types of generic framework, whether process- or content-oriented. None referred to the use of a specific learning process or activity model, as might be provided, for example, by Kolb's (1984) experiential learning cycle or a design protocol for problem-based learning (e.g. see Savin-Baden and Major, 2004). However, generic discipline-related frameworks were evident in descriptions of design as the creation of content or tasks based on those knowledge structures, or procedural activity structures, identified as embedded in disciplinary or professional practice. Our data did not allow for in-depth investigation of the role that disciplinary differences may play in orienting practitioners more towards 'personal' or 'generic' approaches to design for learning. However, it seems likely that differing approaches will be inflected, at least to some extent, by the differing epistemological characteristics of 'high paradigm consensus' disciplines and subject areas as compared with those of 'low paradigm consensus' disciplines and areas (Becher and Trowler, 2001; Donald, 2002).

In Figure 2 the content/process and generic/personal dimensions are represented as a matrix that identifies four distinct emphases in design for learning as described by practitioners in this study. This is not to suggest that the practice of any one individual would fit neatly into one of the four modes; the axes of the matrix represent continua rather than binaries. Designing in any particular context is likely to involve a blend of generic and more personal pedagogical thinking, as well as a combination of process and content considerations. However, in representing differences of emphasis in practitioners' accounts of design, the matrix offers a conceptual

framework that may be useful for further explorations of the nature and practice of design for learning in IBL and different pedagogical contexts, including in different disciplines.

3.1.2 LAMS - pedagogical and design affordances

Pedagogical and design affordances of LAMS for IBL, as reflected in the ways practitioners responded to the tool, are summarised below. We take affordances to be, not inherent properties, but relational and contingent, constructed through fluid, socially and ideologically mediated interactions between people and tools. Laurillard et al. (2000: 3) explain affordances as *"features perceived by an observer* [that] *create the possibility for a certain kind of behaviour"*. Oliver (2005) has discussed the contested and multiple uses of the concept in the learning technology literature; we use it broadly here to refer both to those perceived features of LAMS that encourage particular types of action, and those that offer new possibilities for action.

Linear learning: 'Linearity' was perceived as the principal characteristic of the way in which LAMS supports - and shapes - design for learning, as reflected in most of the metaphors used by practitioners to describe the tool. Linearity was welcomed as a means of reinforcing sequential learning processes and procedures, scaffolding student engagement with small-scale activities as 'chunks' of more complex processes, and instilling a sense of learner achievement. Practitioners were especially likely to see advantages in using the tool to support activity in subject areas in which linear procedures could easily be identified. On the other hand, linear design was perceived to be in tension with more open-ended forms of learning and inquiry in other subject areas; with the needs of 'holist' as compared with 'serialist' learners (Pask, 1976); and with the learning approaches of specific groups. The value of LAMS as a tool to design more complex, 'messy', iterative and extended inquiry processes was questioned, although the features of version 2 were seen as more promising than version 1 in this respect. Practitioners frequently expressed very strong concerns, in particular, about the 'forwards-linearity' embedded into the software.

Process-orientation: LAMS was perceived to offer a fit with the practice of designing for IBL in terms of the foregrounding of 'activity' alongside content. Most pilot LAMS users expressed broadly 'process-oriented' perspectives on design for learning and did not consider that engagement with LAMS had a radical effect on their design thinking in this sense. Some expressed the view that engaging with LAMS had impacted, alongside other influences in the institutional environment, in raising their awareness of possibilities for more strongly activity-oriented approaches to design. This was sometimes contrasted with the more content-focused design influence of the University's VLE.

Tight structure and control: Most practitioners perceived LAMS as a tool for designing tight activity structures with relatively high levels of teacher guidance and control. This was often seen as a welcome feature for introductory forms of IBL (for example, for students at lower levels of study) and for encouraging students to carry out tasks as set, and in the order as set. The tool was also felt to encourage practitioners to be specific in the task guidance they gave to students. On the other hand, the perceived in-built orientation towards tight structures was seen to militate against the principles of open inquiry and student autonomy in the learning process. There was a widely shared sense that LAMS was a tool that most obviously supports - and encourages - relatively strongly teacher-led pedagogy, and this was reflected in the characteristics of most of the sequences produced. These did not, on the whole,

reflect the design characteristics of strongly student-led, open-ended approaches to IBL.

Easy design: Designing with LAMS was generally experienced as relatively easy - a feature that was appreciated. Some pilot users felt that they could dive in and produce a sequence very rapidly. On the other hand, the value of 'stepping back' during the design process to explore underpinning pedagogical purposes and values, for example through reflective interactions with educational developers and peers, or through access to pedagogical planning resources, was confirmed by the project. 'Diving in' was perceived to bring disadvantages; those practitioners who did so sometimes characterised their own initial responses to the LAMS interface as unreflective and felt there was a risk of engaging a mechanistic approach to design for learning. Similar concerns were expressed in feedback from other practitioners in focus groups. While wanting tools that would be easy to use, practitioners were wary of a reductive impact on practice and expressed a desire for tools (and associated support) that would foster critically reflective, imaginative approaches to IBL design.

3.1.3 A good fit?

The transformational potential of LAMS was not fully tested in our study. However, consistent with the findings of previous research (Masterman & Vogel, 2007) the system *per se* was not associated with a fundamental shift in underlying pedagogy, and there was some evidence of a constraining effect. The affordances summarised above meant that LAMS was perceived as a promising tool for some forms of IBL in a range of disciplinary contexts; it was seen to provide well for the design of relatively tightly-structured, discrete inquiry activities. It is worth emphasising that there is an essential role for structure, and teacher guidance and facilitation, in even the most strongly student-led forms of IBL. At the same time, there was little evidence that the tool in itself (in version 1) supported or stimulated strong engagement with ideas, values and practices underpinning more open-ended and student-led approaches to IBL - those which, arguably, represent this pedagogy in its *"truest, most radical and empowering form"* (Hutchings, 2007) and which also, more broadly, align with values and practices associated with Web 2.0.

These findings serve as a reminder that activity-centred pedagogy may at the same time be strongly teacher-centred. LAMS is promoted as a tool that is amenable to widely varied pedagogical approaches. Our conclusion from this evaluation is *not* that it does not have the potential to support design of more flexible, open-ended, student-led forms of IBL. Reflection and discussion amongst practitioners did lead to identification of ways in which sequences might be designed to encourage a high degree of student empowerment, including envisaging students as designers of sequences for themselves or other students. However, while the system's strong emphasis on activity did seem to help orient design thinking towards a process-focused approach, its features did not, in themselves, tend to orient pedagogical thinking and practice in the direction of strongly student-led pedagogies. Practitioners generally did not - especially on initial acquaintance with the design interface - recognise potential for creating strongly student-led designs. To this extent, the tool was not experienced as pedagogically neutral. Moreover, there was a perception that in offering a relatively limited set of possible 'activities', reliance on LAMS as a design tool could serve to limit creativity in design practice. Our evaluation confirmed the value of pedagogical reflection, dialogue and guidance in the development and support of design practice.

3.1.4 Sequences produced and practitioner satisfaction

Practitioners' level of satisfaction with using LAMS was mixed. Those with negative experiences of the technical reliability of the software, and/or with strong reservations about the potential for using LAMS for more student-led approaches to IBL, expressed negative views. Others were positive about their implementations of LAMS in terms of both impact on the student experience and achievement of pedagogical objectives and were enthusiastic about the potential future role for LAMS in their teaching. Practitioners had criticisms of the design interface and functionality; many of these, such as the capability for 'branching', already are being addressed in the further technical development of the tool as described in the Introduction to this report. The need for design tools to facilitate collaborative design was highlighted by a number of practitioners.

The sequences produced through the DeSILA project do not represent externally validated, 'quality assured' examples of practice. Nevertheless, they are valuable illustrations of designs created by novice users of the system (some of whom also considered themselves relatively 'novice' practitioners of IBL and/or of learning technology use) and most were felt to 'work' adequately in practice. Perhaps unsurprisingly, a relatively limited palette of LAMS activities was used for initial sequences. The pilot initiatives tended to be small-scale and practitioners were cautious about ascribing particular effects to the tool. Several practitioners used the tool to replicate designs they had already developed and used in other contexts, while others experimented with new ideas; some said that LAMS had stimulated new ideas for IBL for them. Uses of LAMS in other contexts have shown that the system is often valued for managing the social environment of the classroom, particularly with school-age students. In contrast, those practitioners in this evaluation study who were working in on-campus, classroom contexts often valued opportunities for face-to-face interaction very highly and tended to express reservations about technology-mediated, student-to-student communication in the classroom; consistent with this view, most of the sequences were designed for out-of-classroom use.

3.1.5 Demand on time, resources and competences

Time is at a premium for academic staff and participants in this study emphasised the value of a tool that would be easy to use and would help speed up the process of design for learning. We believe that time constraints were one of the key factors limiting uptake of opportunities to pilot LAMS, combined with concerns that time invested might be wasted if the tool were not to be supported by the University in the longer term. Those who did pilot it, however, generally found LAMS acceptable in terms of the amount of time and level of skills required to begin to create usable sequences, and some compared it favourably to the University's VLE in this respect. Misunderstandings of system capabilities and technical difficulties at the system end proved an obstacle in a few instances. However, users were mostly successful in 'getting up and running' with LAMS fairly quickly, with the support provided.

For the most part the pilot practitioners did not choose to invest time in further developing their skills in using LAMS during the project, beyond an initial experiment. Nevertheless, individuals felt they gained some insights into 'effective' use of the system, for example the need to provide very clear initial instructions to students on the use of the system and encouragement to attend to preliminary task guidelines. Several pilot users expressed a desire for further training and support if they were to develop their use of LAMS further, especially in terms of access to cases and further exemplars of different uses of LAMS in the IBL context.

The question of what LAMS could offer to complement the institutional VLE was identified as critical to practitioner acceptance of the tool in our institutional context. Practitioners did not envisage using LAMS as a replacement for, or alternative to, the VLE but as an enhancement to it, for designing activities for running in MOLE directly or in LAMS as an integral part of MOLE.

3.1.6 Students as (co)designers

The emphasis of the JISC Design for Learning programme has been on tools for teachers. LAMS is essentially a practitioner-focused tool, and this evaluation explored design for learning mainly from the practitioner perspective. However, there was interest in ways in which LAMS might be used by students to design their own inquiry processes and activities. In the Web 2.0 context, and in the context of pedagogies, like IBL, that place emphasis on student-led learning, there is arguably a need to explore the potential value and nature of design tools for learners - whether based on existing design for learning tools (such as LAMS) or on new tools with different functionality. What might a 'design for learning' tool look like that is focused on use by learners rather than teachers? What kinds of support materials might be needed for learners to assist them to use such tools? Might the same tools be useful for teachers as for learners or are different tools needed? Are existing tools suitable or is there a need for tools with a different features and functionality? How might such tools interface with Web 2.0 services and environments? To what extent is LAMS (or alternatively RAMS) itself a useful tool for student-led design for learning?

These questions arise as possible avenues for future research and development in design for learning. There may be a case for the development of explicitly 'student-facing' tools that empower and support students to design, manage and adjust their own inquiry processes, and to use design representations as resources for reflection and sharing with other students, thereby supporting meta-cognition. Social networking and other Web 2.0 tools offer students more freedom and flexibility in constructing personal environments for learning than institutional VLEs, but we can note that they do not offer specific features to assist in designing, managing or representing inquiry processes. Based on the themes arising from the DeSILA project, we can propose that student-facing design for IBL tools would need to include highly flexible research planning features and functionality, and might also include integrated design for learning guidance equivalent to the guidance offered to teachers by pedagogical planner systems and features.

3.2 Sharing and reuse

The evaluation included investigation of attitudes to, and experiences of, sharing and reuse of learning activity materials and ideas within our user community, in order to contextualise responses to LAMS as a specific tool for sharing and reuse. Our data point to a range of factors that appeared to influence practitioners' attitudes and experiences - including disciplinary differences as well as pragmatic and institutional factors.

3.2.1 Dimensions of reuse

Practitioners often reported relying wholly or almost wholly on producing - and iteratively refining and adapting - their own content materials and activity designs for their teaching. Some described reusing both content resources and activity designs generated by someone else for their own teaching. In the latter cases, sources of ideas and materials were generally highly local, and gathering ideas and materials was described as a largely informal, serendipitous process of discovery or

'information encountering' (Erdelez, 1997) rather than of systematic information-seeking. Two broadly contrasting approaches to reuse - 'off the shelf' and 'cherry-picking' - were identified. Figure 3 illustrates how these approaches map on to the framework presented in Figure 2.

'Off the shelf' approaches involved direct transfer of content resources or activity designs with minimal adaptation. This was described as typically involving shared lecture notes or Powerpoint slides. Activity designs were shared and reused in the form of lesson plans or ideas for specific activities. Experiences of off the shelf content reuse seemed to be associated in particular with teaching in 'high consensus' discipline or subject areas. Consistent with this, practitioners seemed more likely to value and reuse 'off-the-shelf' activities when the subject-matter to which these applied was considered to be generic and therefore also directly transferable, for example in the context of team-teaching of a common programme or in areas of skills teaching such as IT or information literacy. In other words, where content was seen as reusable then the associated activity also was seen as reusable.

In contrast, when teaching (and design for learning) was experienced as a highly personal, rather than generic, practice, practitioners were more likely to conceive of both content and activity reuse in terms of 'cherry-picking' ideas for inspiration and adaptation, rather than direct transfer. They tended to emphasise that reuse would involve a significant degree of tailoring and transformation. Some saw preparing repeat teaching from scratch each time as a professional ideal, but the pragmatic benefits of reuse were widely recognised.

The extent to which design for learning was experienced as a personal or generic practice therefore emerged as a key factor underpinning different attitudes to, and experiences of, reuse. Those who described design for learning in more generic terms were more likely to have experienced reuse of both content and activity designs as something closer to 'off-the-shelf' transfer than those who described it in personal terms. Those who described design for learning in more personal terms were less likely to have experienced, or to perceive immediate benefit in, 'off the shelf' reuse. Our data suggest that disciplinary and subject differences play a part in shaping pedagogical attitudes and approaches to sharing and reuse, alongside other factors such as departmental and institutional context and pragmatics such as time and knowledge of available sources. The question of disciplinary difference in reuse and sharing behaviour may prove a fruitful avenue for further research.

Commonly cited constraints on sharing and reuse included limited time at a personal level, and institutional and departmental cultures that were not perceived to strongly encourage sharing of educational practice. On the other hand, team-teaching was in some cases identified as a facilitating factor, as was on-going cultural change in the institution in terms of the growing profile of teaching and a new strategic emphasis on encouraging dissemination of practice within and between disciplines.

3.2.2 LAMS reuse requirements and practice

Practitioners' responses to the potential for sharing and reuse of LAMS sequences reflected the experiences and attitudes outlined above. The possibilities for sharing and reuse of LAMS designs were welcomed by practitioners, especially for 'cherry-picking' inspiring design ideas for discipline-based subject teaching and 'off-the-shelf' adoption of designs for teaching in generic skills and subjects.

Cherry-picking: In the main, practitioners did not envisage 'off the shelf' use of LAMS sequences for their own contexts, but responded positively in principle to the LAMS

format in terms of providing for inspiration and adaptation. They talked about selecting nuggets of good ideas in the form of single activity-components of a sequence, or a short series of components. In practice, however, most pilot users did not review or draw upon sequences other than those introduced directly in the context of preliminary workshops.

Off the shelf: Two of the LAMS implementations taken forward in the pilot were based on largely off the shelf reuse of an existing sequence, both in cases where the subject-matter as well as the activity structure was identified as directly transferable to the context of the teaching. More generally, practitioners tended to envisage off the shelf approaches to reusing LAMS sequences for the purposes of teaching in 'generic' skills and subject areas. The pragmatic consideration of time saved through off the shelf LAMS reuse was widely seen as a benefit, although some practitioners expressed concerns that the convenience of the practice could lead to mechanistic approaches to teaching. Some raised concerns about copyright and intellectual property issues in relation to content embedded into sequences, as possible constraints on reuse of LAMS sequences.

Variety: Practitioners expressed a requirement for access to diverse examples of LAMS-based practice in order to inform their own practice, including different combinations of activity sequencing and examples of longer and shorter overall sequences.

Generic exemplars: Some practitioners responded positively to the idea of gaining access to generic activity sequences without subject content, though they did not necessarily envisage direct transfer of such sequences. Some suggested that they would welcome generic sequences designed to demonstrate patterns of scaffolding for particular learning processes, such as reflection or peer-to-peer interaction, accompanied by links to relevant theoretical or evaluative literature - somewhat along the lines of generic patterns proposed by Goodyear et al (2006).

Sharing and accessing: Practitioners in general indicated willingness, in principle, to share LAMS sequences that they might produce both locally and more widely. In terms of accessing others' sequences, they emphasised the importance of being able to utilise keyword searching at differing levels of granularity, from overall sequences in a subject area, to small 'chunks' of content or activity (for example, searching by different activity tools within LAMS, in order to compare different ways in which these could be used). Personal knowledge of, and contact with, the authors of sequence was identified as a likely strong incentive to view and potentially reuse sequences. Practitioners also expressed interest in author/user annotation of sequences, including critical reflection on using the design in practice and pointers to reuse.

As already noted, positive responses to the concept of reuse were not, in general, mirrored in practice by pilot users looking at others' designs before designing their own, beyond the 'training' sequences. This pattern tends to confirm the findings of other studies (e.g. Walker and Masterman, 2006). Time was identified by practitioners as a key constraint in this respect, and it seems likely that cultural factors also play a part; as noted above, practitioners often were unfamiliar with systematic approaches to sharing and reuse of activity designs whether within or beyond their own discipline areas.

3.3 Reuse requirements for a community of practice

Beyond its focus on LAMS, the DeSILA project explored broader issues relating to sharing and reuse of designs for IBL in a community of practice context. This

informed the development of the CETL's web-based architecture for IBL design cases. Although the DeSILA project did bring 'newcomers' into interaction with CILASS, it was not successful in fostering the development of community of LAMS users during the period of the project. Project-specific platforms designed to facilitate exchange of experience and mutual support did not stimulate much engagement.

This may in part have been because the small-scale LAMS experimentations taken forward through the project remained peripheral to practitioners' main focus of activity and interest in teaching. The number of pilot users was small, and users did not generally create and implement more than one sequence. In addition, the 'stand-alone' LAMS-focused platforms were only loosely integrated with other online environments in the University which support exchange of educational practice. We believe that it will be desirable, in future initiatives aiming to facilitate institutional sharing and reuse of learning designs for IBL, to ensure integration of online environments as much as possible. For this reason, the intention is to integrate the LAMS cases produced through DeSILA into the CETL's new architecture for sharing and reuse of IBL designs for learning.

This is based on a standardised case template plus additional materials representing and annotating designs and providing insights into 'lived experiences' of use. By connecting learning design cases with the University's recently-established 'good practice case' wiki environment the aim is to embed opportunities for community exchange in the form of comment and dialogue. At the time of writing, a portfolio of cases is being developed; the effectiveness (including cost-effectiveness) and sustainability of the model will be evaluated as it is developed further.

3.4 Learner Outcomes

Learning experience: Much student feedback, from both undergraduates and postgraduates, and in relation to all five sequences, indicated positive engagement. Both real-time (classroom-based) and distributed experiences elicited positive feedback. Students reported that they had enjoyed and been stimulated by the LAMS activities, which they had found useful in terms of supporting their inquiry and learning. Specific activities, including resource-sharing and online discussion, and access to a range of multimedia resources, were welcomed. Some students considered that the LAMS activities had encouraged an independent approach to learning; some highlighted the value of the 'forwards-linear' structure of the guided process. Many recommended continued use of LAMS in the context in which they had experienced it, and most indicated that they would like to use it again. On the other hand, some much less positive feedback also was received, in relation to all five sequences; for example, some students complained of the over-structured nature of the same process that others had found supportive, and some of a strong sense of teacher-control. Not all appreciated the linearity of the process. Some students had not enjoyed activities that others had appreciated, and did not feel they had gained a great deal from them. It was pointed out that requiring students to engage in online discussion did not automatically ensure quality of that discussion. Some students highlighted the need for clearer task guidance at the outset of their sequences.

The system: Feedback on the features of the system was frequently positive. Students found it easy to use, and recognised that it offered something different from the University's VLE. Students emphasised that they wanted to be able to move easily backwards as well as forwards in a sequence, including for the purposes of gaining an initial overview of what was to come. Some saw the interface as unattractive and clumsy, and made suggestions for improvements.

Although based on limited data in terms of the number of LAMS initiatives and students involved, we take these findings on learner outcomes to be promising in terms of the likely wider-scale value of LAMS, or a system like LAMS that enables online orchestration of learning activity. It seems likely that the varied learning expectations, preferences and needs that students bring to any learning activity explains the contrasting feedback received on experiences of the same LAMS sequences. Students' differing responses to the highly structured and linear nature of sequences are particularly noteworthy from the perspective of design for IBL. These responses suggest a need for designs in which structure (for example, in the form of guidance and direction) and flexibility (for example, in the form of individual or group 'pathway' choices, or opportunities for students to create their own designs) are combined - and therefore, a need for tools that can support the creation and orchestration of such designs.

3.5 Effectiveness for the organisation

The project explored the question of 'effectiveness for the organisation' in relation to educational development support, organisational costs and processes, systems interoperability and technical support.

3.5.1 Educational development support

Our strategies for educational development support were based on: introductory 'LAMS for IBL' workshops using demonstration and hands-on use of custom-designed IBL sequences; follow-up, one-to-one design support for creation of new sequences; encouragement to review sequences produced by others. This overall support model was generally received very positively by practitioners.

In introductory workshops, practitioners' attention tended to be focused primarily on becoming familiar with the system's technical features and tools. Opportunities for more extended pedagogical discussion and reflection normally took place during one-to-one conversations and these were identified as an essential element of effective support as practitioners moved on to designing their own sequences. The features of LAMS as an activity design tool helped to make 'design for learning' an explicit concept and focus in these conversations. However, one-to-one design support of the kind adopted by the DeSILA project would not be easily scalable in a context of institution-wide roll-out. With this in mind, and in response to feedback on the value of pedagogical reflection and guidance, the project developed an outline framework for a pedagogical planning resource that could support IBL uses of LAMS and at the same time integrate with a broader-based resource on designing for IBL.

Feedback indicated that, as follow-ups to introductory workshops, there would be value in providing further educational development workshops, which should include 'case study' presentations by other practitioners who had used LAMS for IBL.

Custom-designed sequences offered examples of IBL activities in specific subject areas and provided a valuable starting-point for critical and reflective discussion. Building on this model, practitioners wanted access to a variety of different exemplar sequence types (for example, both shorter and longer sequences, and sequences illustrating pedagogical uses of different combinations of LAMS tools). Given that they did not immediately envisage more strongly 'student-led' IBL designs in LAMS, we believe that it will be important to provide examples of these in future support strategies and to introduce these from the outset of familiarisation with the system.

As already noted, while practitioners were encouraged to look at others' sequences, both locally or via the LAMS International website, few did so despite expressions of intent and interest. This suggests that it may be worthwhile to explore the value of some form of intermediary service as part of any future educational development support strategy - for example, through development staff providing a current awareness service pointing to sequences of interest.

While there was little user engagement with the platforms set up to provide a 'one-stop' point of community exchange for LAMS users, we consider that the wider organisational climate in the University relating to development and innovation in learning and teaching provides a supportive framework for community-building and exchange for design for learning. The recent establishment of a University-wide 'good practice' wiki for exchange of information and experience on teaching, combined with the development of the CETL's online IBL case portfolio, offer opportunities to integrate LAMS-based designs into a wider institutional framework for community interaction.

3.5.2 Organisational costs and processes

The project was successful in developing a limited but solid foundation of organisational capacity in the use of LAMS, in terms of expertise in technical and educational support and also amongst a range of academic staff. The developer staff involved found the system easy to learn from the outset and continued to developed expertise in an on-going way through support for use.

It is difficult to make a strong institutional case for the resources necessary to implement LAMS across the institution at this time. As with all new technologies LAMS is still undergoing significant and continued development. From an institutional perspective, whilst the costs associated with this activity are dependent upon the decision to either host the LAMS software locally or to continue with the hosted service, the most significant element is the recurrent ongoing human resource associated with the provision of user support and guidance via a helpdesk service. If the system was to be hosted locally, the cost of the human resource required to maintain and monitor the service would again be the primary consideration rather than the cost of the necessary hardware.

At institutional level, the project has helped to bring the question of design for learning into sharper relief and provides confirmation of the importance of institution-level 'strategic steer' in educational development and technology adoption. Design for learning tools could be integrated with existing institutional mechanisms for stimulating practitioner engagement, such as the University's Learning and Teaching Development Grant Scheme or the equivalent CILASS scheme for IBL development. Given that users of LAMS in the pilot project required dedicated training support in the system to allow the exploitation of its potential to support the design for learning concept, these mechanisms would require the associated educational and technical support structures to be established specifically for LAMS prior to its launch.

It is clear that the uncertainty associated with pilot status of this project did impact on user perceptions and motivation to engage with the proposed activity, as they sought assurances that any investment of the time and energy in learning how to use the system would not be wasted should LAMS not be institutionally adopted. This is a useful indicator of the cost to the potential user of the necessary training required to familiarise themselves with any new technology, in this specific case, LAMS. It also demonstrates the complex nature of distinguishing the demands or benefits of a specific technology and the educational concept or pedagogy being developed.

Typically, users find it easier to relate to the tangible nature of the technology rather than the underlying principles.

One question is whether it is the use of LAMS that has stimulated design for learning concepts or the specialist support from the project team in the provision of central staff development initiatives. We suspect that the latter has had major impact, with LAMS providing a valuable focus for the introduction of the key concepts and subsequent discussion.

The question also arises as to the relative merits of systems (such as LAMS in the version we used) in which tools for design and tools for orchestration tools are closely coupled, as against tools in which support for design is separated from support for delivery. From an institutional perspective, it is the design functionality of LAMS that has had the most interest and value in terms of the design for learning concept. Whilst the delivery tool is attractive in a number of ways, it may add another layer of complexity for staff and students who are already familiar with the institutional online learning environment. We intend to explore ways in which support for design for learning can be separated from the technology of delivery/orchestration, in order to provide maximum flexibility for designers in the run-time technologies at their disposal.

3.5.3 Systems interoperability and technical support

The project enabled us to explore aspects of interoperability and technical support requirements for the use of LAMS in our institutional context. The following points emerged:

Server hosting. The project used the external hosting service provided by *LAMS International* to provide server access, initially to version 1 and subsequently to version 2 of the system. Delays with the version upgrade and, more seriously, other problems arising at the hosting end prevented timely implementation of some project activities and some planned sequences could not go ahead. It was thought that some of the specific technical problems encountered by users of version 1 were connected with server problems. Whilst the project did not formally test in-house hosting of LAMS, consideration of the related costs would suggest that the externally hosted service trialled as part of this project would be the preferred approach over the short term. This would pass the risk associated with the developmental nature of the LAMS software to the external provider and enable the institution to concentrate on providing user support as opposed to technical infrastructure. We are confident that the externally hosted service will improve as they get greater experience of the software and user expectations.

External technical support. The project monitored technical problems arising and benefited from support from both *LAMS International* and interaction on the *LAMS Community* website to resolve most of them fairly rapidly. Several related specifically to version 1 and have since been resolved. The number of technical problems was considered to be acceptable in the context of this early stage of software development and a pilot project. However, technical stability and robustness is a key concern for institutional roll-out as it could severely undermine the confidence of users at an early stage in their adoption of the software.

Institution-level support and systems integration: Practitioners emphasised that their continued use of LAMS would depend firstly on institution-level support for its use and secondly on seamless integration (without a need for a separate login and password) with the University's VLE. The project was unable to test system-level

integration between LAMS and the institutional VLE. However, it is anticipated that an appropriate link to the Blackboard learning environment will be developed by the LAMS community, enabling a seamless integration between LAMS and the Sheffield MOLE environment. There are some concerns that the duplication of functionality between LAMS and the learning environment may result in a degree of confusion for some users. This would need further investigation once the integration issues are resolved.

Local technical support: Technical support was provided locally during introductory workshops and then on a one-to-one basis as practitioners developed and implemented sequences. The support provided in this way received very positive feedback. Users were made aware of sources of technical help via the LAMS International Community but few followed this up. This suggests that it is unlikely that practitioners would wish to look beyond the institution for technical support if the system were to be rolled out in the longer term.

4. Conclusions and recommendations

4.1 Conclusions

To what extent does a tool such as LAMS add value to the practice and impact of designing for IBL, and to the dissemination of IBL pedagogy?

This was the over-arching question explored by the DeSILA project. LAMS was piloted with a view to evaluating proof of concept regarding design for learning tools for this specific pedagogical context.

The project provided evidence of the value of a tool that can bring the concept of design for learning to the fore and support the practice of process-aware design for IBL. It also provided evidence of the benefits of LAMS itself in the design and orchestration of some approaches to IBL in particular. LAMS is currently being developed in ways that respond to some of the concerns and issues raised by this pilot and this was welcomed by participants in the project. At the same time, the project highlighted the role for pedagogical guidance in informing practice when a design system such as LAMS is being used, and the importance of opportunities for practitioner reflection and dialogue in supporting design for IBL.

The project suggested the value of 'decoupled' design and orchestration functionality in design for learning tools, and of future exploration of requirements for tools for students as (co)designers of their own learning. The project also highlighted some potential limitations of a 'closed' (platform-specific) system such as LAMS in the dissemination of designs for learning.

To what extent do the features and functionality of LAMS fit with practitioners' purposes and values in designing for IBL, and with their approaches to the design process?

LAMS offered a fit with some pedagogical purposes and values in relation to IBL. The version tested was perceived as a promising tool for some forms of IBL in a range of disciplinary contexts. In particular, it was seen to provide well for the design of linear forms of inquiry and relatively tightly-structured, teacher-controlled pedagogy. It appeared considerably less well-suited to the design of more flexible and open-ended forms of inquiry and despite its orientation towards activity it did not tend to direct pedagogical thinking and practice towards student-led pedagogy. Some practitioners identified little connection between what they perceived LAMS offered and the design and facilitation of IBL for more autonomous, advanced learners.

LAMS offered a positive fit with the broadly process-oriented nature of designing for IBL, and some practitioners felt that it helped them to become more activity-conscious as designers and identified advantages in being required to think carefully about activity sequencing and giving clear activity-related instructions to students. However, the ease with which activity-design was supported by LAMS, combined with the limited palette of tools available, was also perceived as bringing a risk of unreflective, mechanistic approaches to design.

Overall staff satisfaction with LAMS was mixed. Some practitioners were enthusiastic about the capacity to guide students through structured, relatively linear sequences of inquiry activity, and welcomed LAMS as more effective than the institutional VLE in this respect. Pilot users were in general satisfied with impact on the student experience. However, practitioners perceived LAMS as unsuited to

supporting design for more open-ended, independent forms of student inquiry and some questioned its 'added value' in relation to the institutional VLE for orchestration of student learning.

What are the characteristic ways in which practitioners use LAMS in IBL design, including in conjunction with other online tools? How do their pedagogical beliefs and values impact on their use of the tool?

The sequences produced by practitioners through the DeSILA project generally were small-scale initiatives in more teacher-led approaches to IBL. Novice users of LAMS typically created short sequences using a limited number of its tools. They often wanted to use LAMS in conjunction with the institution's VLE, but there was limited opportunity to do this during the project because of interoperability constraints. The high value practitioners placed on face-to-face interaction in the classroom meant that they often approached LAMS as a way to design out-of-classroom activity rather than as a tool for in-classroom use.

What does LAMS contribute to the development of effective practice in designing for IBL, in relation to both design-from-scratch and reuse?

The small-scale nature of the DeSILA project, with fewer pilot implementations of LAMS than had been hoped, meant that LAMS ultimately had limited reach at institutional level in relation to on-going IBL practice. Individual pilot practitioners did not in general feel that LAMS in itself had substantially developed their IBL practice, although some felt that their LAMS-based activities worked better than previous (face-to-face) instantiations of similar activity-sequences. However, the reflection and dialogues that took place around the use of LAMS were identified as positive developmental stimuli, in particular in making the concept of design more explicit in pedagogical practice.

Two of the pilot implementations reused, in full, a LAMS sequence that had been introduced during an introductory workshop; other sequences were designed on the basis of practitioners' previously implemented face-to-face activities, and some were designed completely from scratch, from new ideas. LAMS therefore proved amenable to any of these possibilities. However, although practitioners expressed enthusiasm about the idea of sharing and reuse of sequences, few consulted other LAMS sequences when creating their own, whether locally produced or otherwise. The project findings pointed to a range of cultural factors in practices of sharing and use, and confirmed the need for local, community-focused strategies to encourage development of active sharing and reuse practices.

Are the demands made on practitioners' time, resources and competences acceptable?

LAMS was experienced as relatively easy to use and the demands on novice practitioners' time, resources and competences to enable them to get up and running with the system were found to be acceptable. Nevertheless, practitioners were concerned that their investment of time and energy in learning how to use LAMS would not be wasted should LAMS not be adopted at institutional level and we believe this factor was a major inhibitor of practitioner engagement with the system and the project.

Does the use of LAMS impact positively on the student learning experience, in relation to learning preferences, needs and goals, and in both real-time classroom/field implementations and as a tool for distributed (asynchronous) IBL?

Overall, we take the findings on learner outcomes to be promising in terms of the likely wider scale value of LAMS, or a system like LAMS, for both classroom-based and distributed uses but the latter in particular. There were some clear indications of positive student engagement, with students reporting enjoyment of LAMS-based activities and beneficial impact on their learning experience. Some students compared using LAMS favourably with using the University's VLE, and some appreciated the 'forwards-linearity' of the guided learning process. However, both undergraduate and postgraduate students' responses to using LAMS were mixed, including some very negative responses. Students frequently commented negatively on the inflexibility of the process (especially as regards the ability to independently move freely back and forward through a sequence) and some questioned the 'value-added' of learning with LAMS. It seems likely that differing feedback on experiences of the same LAMS sequences was a result of variation in students' learning expectations, preferences and needs.

What are the implications of the use of LAMS in terms of educational development support, organisational costs and processes, systems interoperability and technical support?

The project offers some pointers to supporting first generation engagement with LAMS. Introductory workshops followed by opportunities for one-to-one educational development support were welcomed. A need was identified for a pedagogical planning resource to support IBL uses of LAMS, and practitioners wanted case study presentations of LAMS implementations by other practitioner-users.

Some organisational costs associated with LAMS follow from the decision to either host the software locally or use the external hosting service. However, the most significant organisational cost associated with LAMS is the recurrent human resource associated with the provision of user support and guidance. The project demonstrated that systems integration with the institution's VLE would be essential to practitioner acceptance of LAMS beyond the pilot. It also suggested that most practitioners would be unlikely to look beyond the institution for technical support (e.g. to *LAMS Community* forums) if the system were to be rolled out in the longer term, making provision of in-house 'help-desk' style support (supplemented in in-classroom support where needed) essential.

What are practitioners' requirements for effective reuse of LAMS-based designs and what factors facilitate and/or constrain the sharing and reuse of LAMS-based designs within and across disciplines, and within and between institutions?

Key factors constraining the sharing and reuse of LAMS-based designs were: cultural factors in disciplinary practices of teaching; time constraints. A facilitating factor was: mediated awareness-raising about relevant designs. More broadly, practitioners' attitudes to reuse suggested that they might be more open to reusing LAMS-based designs in a 'wholesale', off-the -shelf way when the content is perceived as generic and therefore directly transferable. However, practitioners also responded positively to the prospect of using LAMS to 'cherry-pick' design ideas for adaptation to their own needs. The need for flexible keyword access to repositories of LAMS sequences was highlighted. The project findings suggest that practitioners may be more likely to use local rather than remote repositories of LAMS-based designs.

More broadly, what are the learning design reuse requirements of a community of practice for development and innovation in IBL?

A community of practice for development and innovation in IBL emerges through participatory engagement with a variety of shared resources and practices rather than use of a single system (which might be viewed as only one of a wide range of possible tools in an IBL 'toolkit'). DeSILA was not successful in fostering the development of an IBL community of LAMS users during the period of the pilot. Project-specific platforms designed to facilitate exchange of experience and designs did not stimulate much engagement. This experience suggests that repositories of LAMS-based designs should be as closely integrated as possible with other practice-sharing platforms in the context of community-focused development and innovation, so that practitioners have a 'one-stop' interface to exploring and sharing different pedagogical resources and tools.

Concluding remarks

For us, the project raised a question about the design for learning concept. As articulated by the JISC Design for Learning programme, this emphasises the role of activity in the experience of learning and of activity design in the practice of teaching. There is value in focusing attention on activity in design for learning, including in relation to IBL as demonstrated by the DeSILA project. However, the fundamental activity in IBL is that of intellectual inquiry, and this is inseparable from engagement with content. Too strong an emphasis on activity in design for IBL may serve to create a counter-productive separation of content and activity in both the practice of design and the experience of learning. There may be a case for some rebalancing of the definition of design for learning to reflect a more integrated conception of the relationship between process and content in learning and knowledge-creation.

We finish by emphasising that teaching is an intellectual, moral and creative activity, rather than a solely technical/practical exercise. Tools (and associated community and institutional processes) are needed that engage imaginative and critically reflective approaches to teaching. There is no one way to design and facilitate IBL. Hutchings (2007) argues that by its nature this pedagogy *"embodies opposition to the tendency for educational theories to become ossified into set patterns"*. We believe, on the basis of the findings of this project, that there is an important role for easy-to-use design for learning tools, such as LAMS, in helping to generate and share creative designs and design ideas for IBL - but that in using such tools attention needs to be paid to avoiding the risk of fostering fixed or mechanistic conceptions of either inquiry or teaching.

4.2 Recommendations for effective embedding and use of LAMS for IBL

4.2.1 Academic practice

The following are expressed as a basis for developing guidelines for practitioner-designers with roles in design for learning. They reflect the CILASS approach to conceptualising design for IBL and major themes from the findings of this study. They do not provide exhaustive guidelines on designing for IBL and are not allied to a specific version of LAMS.

The inquiry process

1. As your point of departure, consider what type of inquiry process you want students to engage in: for example, a relatively teacher-directed, step-by-step process in a set linear sequence, or a more student-directed, open-ended, emergent process.

2. Consider whether you are using LAMS to design an activity sequence to support formal, discipline-based research practice, or a broader process of student questioning, exploration and investigation.

3. Consider whether the inquiry process is designed primarily to facilitate students' exploration of the existing knowledge-base of their discipline, or additionally to invite their participation in contesting and building disciplinary knowledge. This may affect the activities you design.

4. Consider the inquiry-related capabilities and skills the process is intended to help develop.

5. Consider frameworks such as Kolb's learning cycle ("do, reflect, conceptualise, apply"), or a problem-based learning protocol, as possible ways of structuring the overall process you would like students to engage in.

6. Use LAMS to design small-scale, short inquiry processes as well as more complex, holistic and longer-term inquiry processes.

Inquiry task(s) and their sequencing

7. Situate an inquiry task or tasks at the centre of the students' experience, using LAMS to design learning activities and access to content resources that will support the inquiry process.

8. Select task(s) that engage students with authentic questions and inquiry practices of the discipline. You may wish to use LAMS to plan activity-sequencing that will facilitate a tightly-structured, step-by-step process of exploration and discovery. Alternatively, you could use LAMS to plan more loosely-structured activity-sequencing.

9. Aim to create designs that offer both flexibility and structure to students, to meet the needs of different learning preferences and styles. For example, consider building in choices in the pathways by which students may pursue their inquiries.

10. Consider initiating activity sequences with an open question or scenario, or a reflection or discussion activity.

11. Consider how the inquiry task(s) will be established - by the students, the tutor, or through a process of collaboration and negotiation. A sequence could start with students framing their own questions or problems. You could use LAMS to design activities that invite students to work together to generate and pursue lines of inquiry. Consider giving students the opportunity to use LAMS as a design tool, either for student-led or co-design (with tutors) of the inquiry process.

12. LAMS can be used to design inquiry activities that could be run completely in LAMS, or outside of it in face-to-face or other technology-mediated settings. LAMS-based inquiry activities can be used productively to extend and reinforce classroom-based IBL activity, and to further scaffold students' participation in IBL outside classroom time.

13. It may be useful not to see the LAMS sequence as a series of activities that have to take place in one time-period without a break. Instead, you could intersperse LAMS-based activities with face-to-face interaction and periods of student reflection.

14. Consider using LAMS to design 'bite-sized' sequences of activity that, run in LAMS, could scaffold students' engagement with larger, more complex inquiry processes.

Other aspects

15. Provide a clear indication, at the outset of a sequence to be run in LAMS, of what the whole sequence will involve, and clear instructions to students. Allow in your design for the fact that students may want to move rapidly through the whole sequence, to gain an overview of it, before returning to begin at the start.

16. When using LAMS in the classroom, make sure students read initial instructions before moving on. For in-classroom or out-of-classroom implementations, consider using an introductory, student-facing tutorial on using LAMS, or create one to suit your own purposes and context.

17. Where appropriate, design 'process support' activities and resources in relevant areas such as reflection, information literacy or IT skills, as well as discipline-based methodologies and techniques. For example, for sequences to be run in LAMS, tools enable you to require students to reflect and keep notes periodically throughout a sequence and then collate their responses in a more coherent fashion towards the end. Many of the system's tools - including but not only 'share resources' and 'resources plus forum' - may be used for information literacy development activities. 'Share resources' and 'share resources plus forum' enable students to share information about how they located and evaluated resources, and to review each others' selections.

18. Consider how you will encourage students to draw on their existing knowledge, and identify new learning and information needs related to their inquiry. They will need to access relevant information resources to support their inquiry. For sequences to be run either within or outside of LAMS, consider providing access to and/or encouraging use of a variety of multimedia resources.

19. Consider the resources you wish to share with students. Do you wish to share PowerPoint presentations or handouts used in class, link to websites and multimedia resources, or ask students to read academic resources in preparation for the next step in the sequence? These considerations may affect the order of activities and the number of resources you can comfortably ask students to engage with.

20. A sequence might use LAMS in conjunction with a VLE or other software such as a wiki. For example, a VLE could be used as the repository for content that supports a LAMS-based inquiry activity, and for the sharable outcomes (products) of LAMS-based student inquiries.

21. LAMS can be used to design for tutor and peer interaction, collaboration, facilitation and feedback. For sequences to be run in LAMS (as elsewhere) it may be helpful to establish guidelines for 'appropriate' communication using its asynchronous and synchronous tools.

The design process

22. When designing with LAMS, take opportunities to 'stand back' and reflect on the design of the sequence as it is developing. It may be useful to move from initial

planning with pen-and-paper (or other tools) to designing in LAMS as a second stage, rather than moving immediately to design in LAMS itself.

23. Take opportunities to look at other examples of LAMS-based sequences, especially different examples of IBL designs. Invite 'peer review' of your sequence for feedback and discussion. Look at LAMS International for LAMS-based designs and other sources of designs for IBL (e.g. cases studies).

24. Use already-produced LAMS sequences for inspiration and adaptation to your own needs, for both the activities they use and elements of content.

25. Consider using previously created LAMS sequences (or parts of sequences) 'off-the-shelf', perhaps in particular for 'generic' areas of your subject teaching or generic skills development activities.

26. Share your LAMS-based design with others, through LAMS International and any local repositories.

4.2.2 Educational development and technical support

The following points are offered as recommendations for educational developers and technical support staff working with newcomers to LAMS for IBL.

27. Provide introductory 'training' events which enable users to experience (as learners and designers) one or more IBL sequences.

28. Follow up with 'case study' workshops that enable new LAMS users to see IBL designs that have already been used and to interact with their authors/users.

29. Provide a wide range of examples of activity-sequences, illustrating a variety of IBL approaches, different combinations of activity sequencing, and longer and shorter sequences.

30. Show uses of LAMS for both discipline-based IBL and 'generic skills' development activities that support IBL.

31. Include among these examples both more strongly teacher-led, tightly structured designs and more strongly student-led, open-ended designs.

32. Include a mix of generic activity sequence exemplars that demonstrate patterns of scaffolding for particular IBL processes (and, where appropriate, link to relevant supporting literature) and contextualised, real-life 'case' exemplars.

33. Illustrate the distinctive nature of LAMS in relation to a VLE, and pedagogical uses of LAMS embedded into, or used in conjunction with, a VLE.

34. Provide LAMS users with a range of opportunities for pedagogical reflection, discussion, support and critique - including face-to-face and online interaction, and guidance systems/materials - in which the concept of 'design for learning' is made explicit.

35. Provide access to a pedagogical planning resource for IBL in LAMS.

36. Consider offering a targeted intermediary 'current awareness' service to disseminate sequences produced within and outside of the local institution to individuals to whom they may be of particular interest;

37. Incorporate the use of LAMS for IBL in staff development initiatives that focus on design for learning practice (e.g. development programmes for new academic staff).

38. Provide a variety of means of in-house individual access to technical support, including in-classroom support as well as online guidance and phone support.

4.2.3 Institutional policy and strategy

These points are offered as institution-level recommendations for LAMS 'roll-out'.

39. Embed LAMS into the institutional VLE environment from the outset of adoption of the system.

40. Use institutional teaching enhancement mechanisms to resource exemplar projects.

41. Disseminate use via existing institutional dissemination channels for learning and teaching, e.g. newsletters, internal conferences, case study repositories etc.

42. In the light of potentially low use of external repositories, consider creating local (institutional or departmental) repositories of LAMS-based IBL designs. Provide keyword access to repositories at different levels of granularity; include author/user reflection and opportunity for comment by those viewing or reusing designs.

43. Embed access to LAMS-based sequences into existing institutional mechanisms/platforms for dissemination of practice in learning and teaching.

4.2.4 Development of learning design systems

These points are offered in relation to the further development of LAMS and other design for learning tools.

44. Modularisation of LAMS as two separate units (design tool; orchestration tool) should be considered (i.e. 'system decoupling' of support for design from support for orchestration);

45. Design tools should be able to be integrated with differing learning environments to facilitate integration with established delivery platforms.

46. Design tools should provide for a high level of design flexibility, in terms of choices about the extent of structure and control of students' inquiry processes.

47. Systems should support the creation of designs that will be appropriate for different learning styles and preferences, for example enabling easy backwards and forwards movement through sequences.

48. In order to facilitate critical reflection in design practice, tools should provide for integrating or directly linking to pedagogical guidance and exemplars.

49. Systems should support collaborative design (i.e. multiple designers working on shared sequences); design ‘on the fly’ in the classroom; easy ‘cut and paste’ of segments of design sequences from one sequence to another.

50. The possible value of, and requirements for, dedicated ‘student-facing’ design for learning tools should be explored.

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Appendix 1

LAMS Introductory Workshop Questionnaire

1. *Today's workshop met my expectations*

Strongly agree [ ] [ ] [ ] [ ] [ ] Strongly disagree

Please comment

2. *I found it easy to use LAMS*

Strongly agree [ ] [ ] [ ] [ ] [ ] Strongly disagree

Please comment

3. *I believe LAMS could support my students' inquiry-based activities*

Strongly agree [ ] [ ] [ ] [ ] [ ] Strongly disagree

Please comment

4. *What specific areas of LAMS support do you think you would need to design and run sequences?*

Please comment

5. *Finally, please feel free to make any further comments*

Appendix 2
Practitioner pre-implementation interview guide

Pedagogy and inquiry-based learning (IBL)

- Your approach to teaching generally and where IBL fits in.
- What IBL means to you.
- Your approach(es) to IBL - prompts: purposes, what's involved for students, use of technology.

Designing for learning

- How you normally go about designing for learning - bits of modules and whole modules - prompts: points of departure (activity/content); main factors taken into account; working solo/collaboratively; tools; sources of design ideas/reuse; triggers for (re)design; sharing; constraints on design.

LAMS implementation – the module, what you plan to do, expectations (if appropriate, 'theory of change')

- Role of IBL in the module.
- Reasons for experimenting with LAMS.
- Intended use of LAMS - prompts: kinds of activities; LAMS tools; previous use of this activity; hoped-for improvements through using LAMS; use specifically to support student inquiry.
- Hoped-for benefits for students and teacher(s).
- What needs to happen (activities) to achieve intended outcomes
- Resources and enablers needed to achieve intended outcomes.
- How you plan to design your LAMS sequences (e.g. with assistance/on own, using other tools, templates etc.)

Open discussion

- Anything further relating to our themes that you'd like to add.

Appendix 3
Baseline Information Questionnaire

Name	
Department/Faculty	
Email	
Job title	

1. Course/module title:

Year/level of study UG { }: level 1 { } level 2 { } level 3 { } PG { }

2. How many students will be involved in your LAMS class? { }

3. When does the module run? Please give dates:

From: to:

4. At what point in the module do you plan to run the LAMS activity sequence:

From week no: to week no:

5. Please specify whether you are designing the LAMS activity sequence for a new or existing module: New { } Existing { }

6. Do you plan to use LAMS in conjunction with a virtual learning environment e.g WebCT Vista. Yes { } No { }

7. Do you use any other form of e-learning technology on this module? Yes { } No

8. How do you plan to use LAMS with your students?

In the classroom only { } Outside the classroom { } Both { }

9. Please rate your general familiality/proficiency with learning technology.

Expert { } Good { } Average { } Low { } None { }

Appendix 4
Practitioner post-implementation interview guide

Preliminary review

- How you felt using LAMS went.

Design

- How you went about designing with LAMS.
- 'Value added' to designing learning and teaching activities? Prompts: ease of design? reuse/sharing of designs? 'Value added' to IBL dimension? Prompt: new/different IBL thinking/elements?
- Design problems, constraints?
- What would you do differently in future design with LAMS?

Orchestration

- Desired learning/teaching outcomes achieved (review ToC if appropriate)?
- Strengths/successes/benefits of using LAMS (technical, pedagogical issues)?
- Problems/weaknesses with using LAMS (technical, pedagogical issues)?
- Students' responses and feedback?

Support

- Value of pedagogical and technical support received? Additional or different support needed?

Acceptance

- How demanding/difficult to design and implement LAMS sequence (time, competencies, resources)?
- Recommend University adopt LAMS?
- Would use LAMS in the future?

Overall

- Metaphors for LAMS?
- Expectations met?
- Advice to LAMS developers?

Open discussion

Anything further relating to our themes that you'd like to add.

Appendix 5
Student Feedback Questionnaire, Follow-Up Interview Guide and Questionnaire Results (quantitative)

Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), Strongly Disagree (SD)

The LAMS activity	
1. I enjoyed the LAMS activity on this module.	SA { } A { } U { } D { } SD { }
2. I found the LAMS activity stimulating and useful.	SA { } A { } U { } D { } SD { }
3. The LAMS activity was effective in helping me learn about my subject.	SA { } A { } U { } D { } SD { }
4. The LAMS activity involved me in a new way of learning.	SA { } A { } U { } D { } SD { }
5. The LAMS activity helped me carry out some useful research/exploration.	SA { } A { } U { } D { } SD { }
The LAMS System	
6. I found LAMS difficult to use.	SA { } A { } U { } D { } SD { }
7. I found LAMS flexible to use.	SA { } A { } U { } D { } SD { }
8. I found the LAMS interface attractive.	SA { } A { } U { } D { } SD { }
9. It took me too long to learn how to use LAMS.	SA { } A { } U { } D { } SD { }
10. I recommend that this module continue to use LAMS.	SA { } A { } U { } D { } SD { }
11. I found the LAMS system too restrictive.	SA { } A { } U { } D { } SD { }
12. I would like to use LAMS again.	SA { } A { } U { } D { } SD { }
13. Using LAMS was quite different from using WebCT.	SA { } A { } U { } D { } SD { }
14. I prefer WebCT to LAMS.	SA { } A { } U { } D { } SD { }

Open questions

15. What were the best aspects of using LAMS, from your point of view?

16. What were the worst aspects of using LAMS, from your point of view?

17. Please add any further comments about your experience of this LAMS activity, which will help us to evaluate the effectiveness of this particular LAMS activity, and LAMS as a system

Thank you for your time and cooperation. If you are willing to take part in a focus group interview about your experiences of using LAMS then please provide your contact details below (we can offer £10 to those selected to take part).

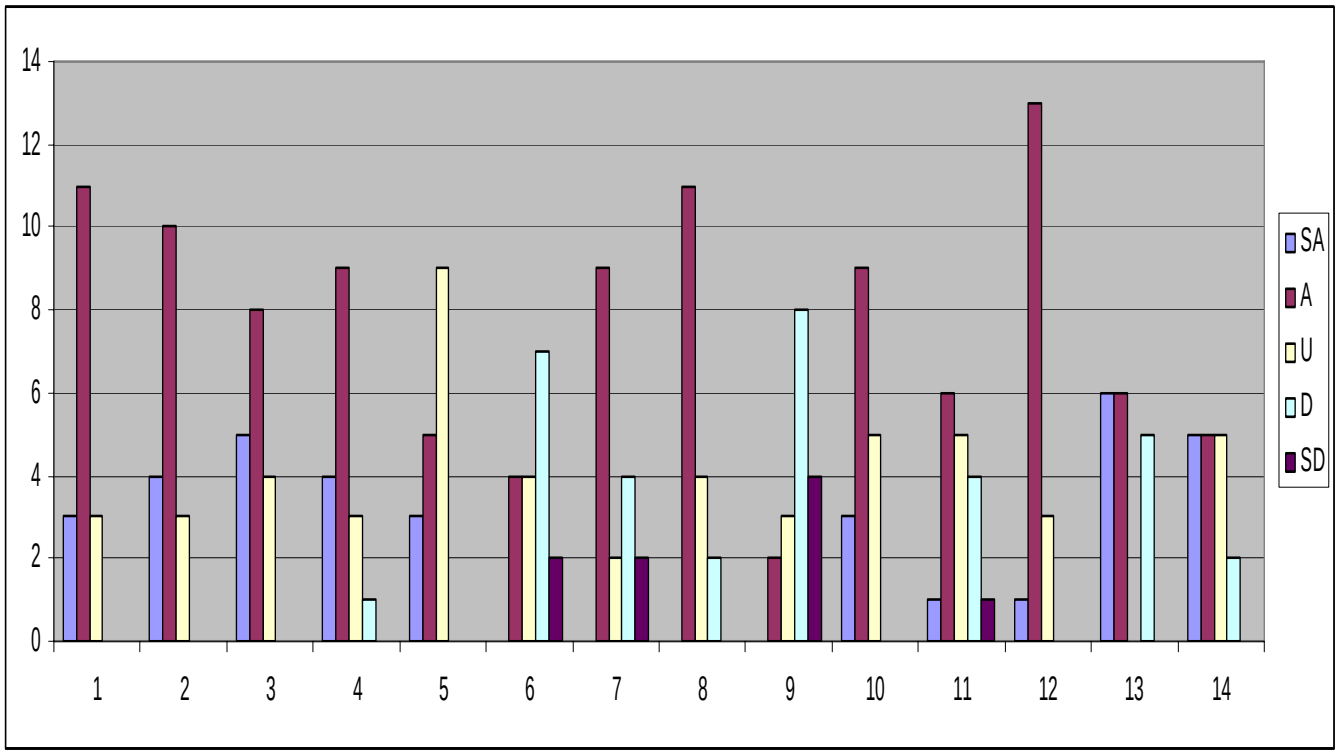
Follow-up Focus Group Interview Guide

Follow up and further explore all questionnaire responses. Explore perceptions of weaknesses/strengths of LAMS activities, LAMS as a system. Explore students' views of elements of sequence they did (resource-sharing, discussion/collaboration, etc).

What might have improved the experience (advice to academic staff designing the sequence)? What could be improved about LAMS (advice to developers)?

Student questionnaire results (quantitative)

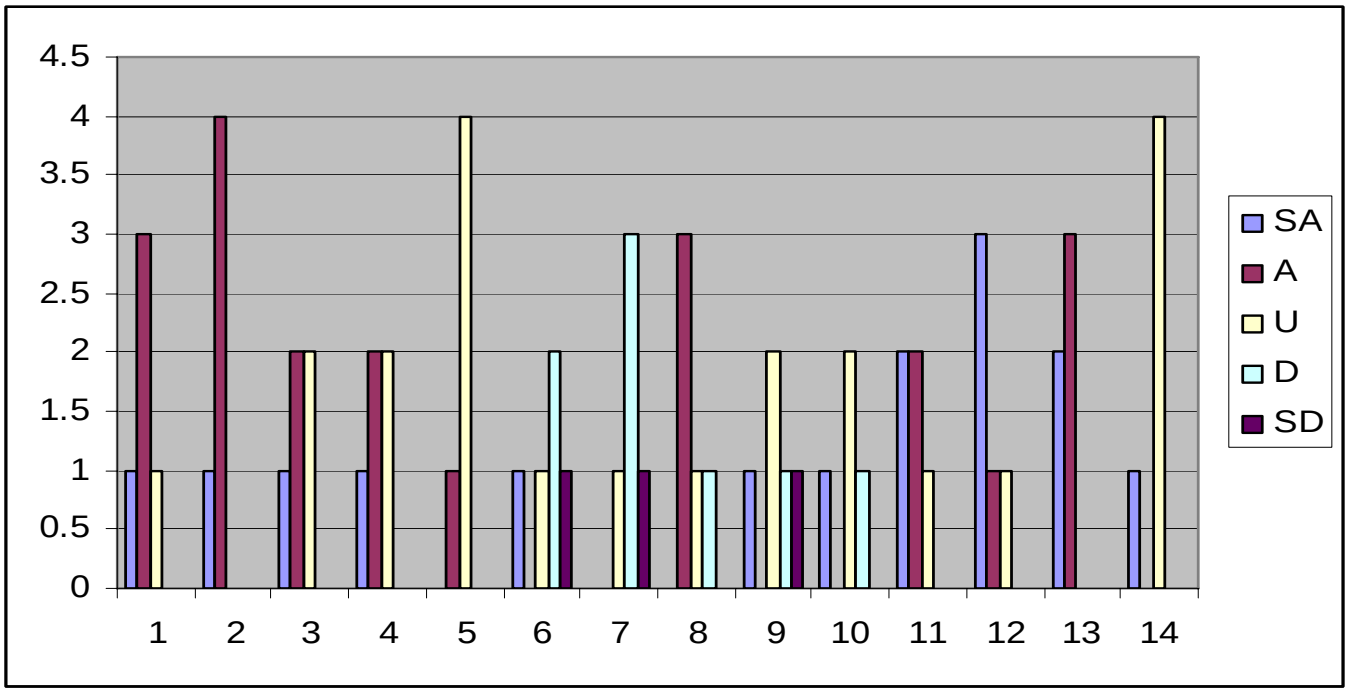
Pilot case 1 (17 respondents)



questions	SA	A	U	D	SD
1	3	11	3		
2	4	10	3		
3	5	8	4		
4	4	9	3	1	
5	3	5	9		
6		4	4	7	2
7		9	2	4	2
8		11	4	2	
9		2	3	8	4
10	3	9	5		
11	1	6	5	4	1
12	1	13	3		

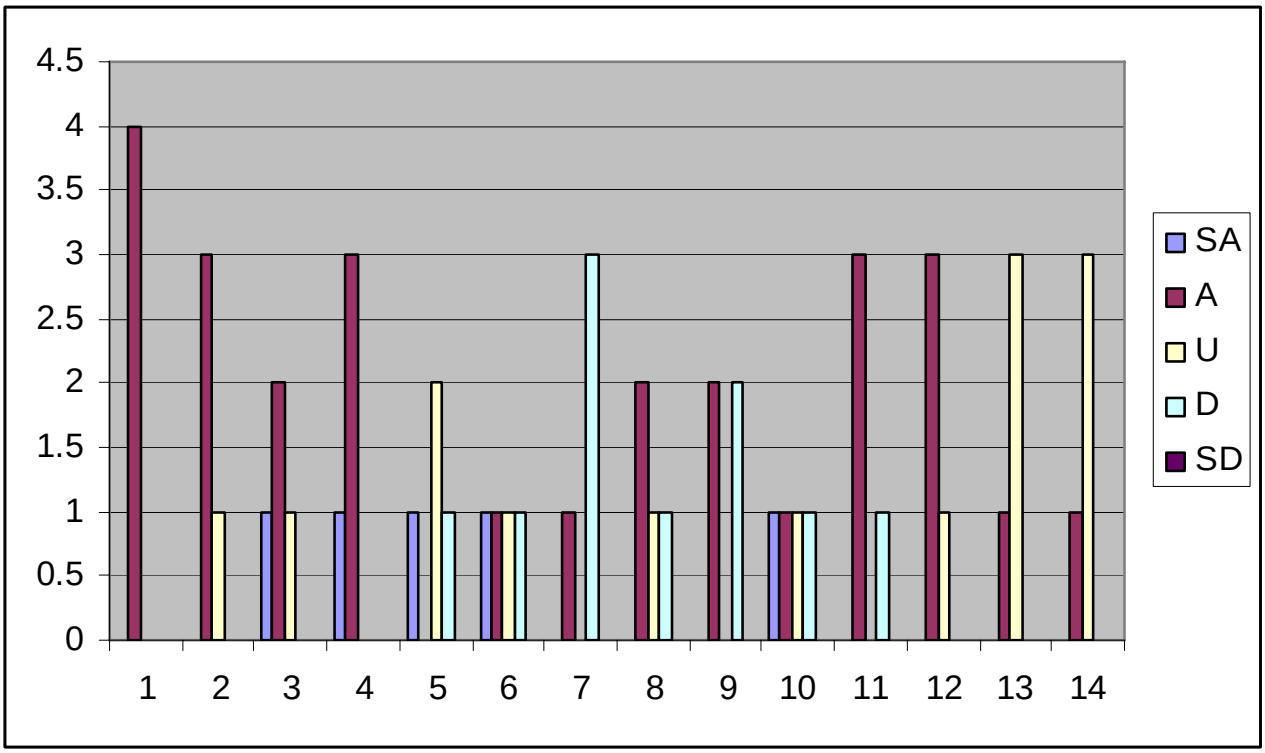
13	6	6		5	
14	5	5	5	2	

Pilot case 2 (5 respondents)



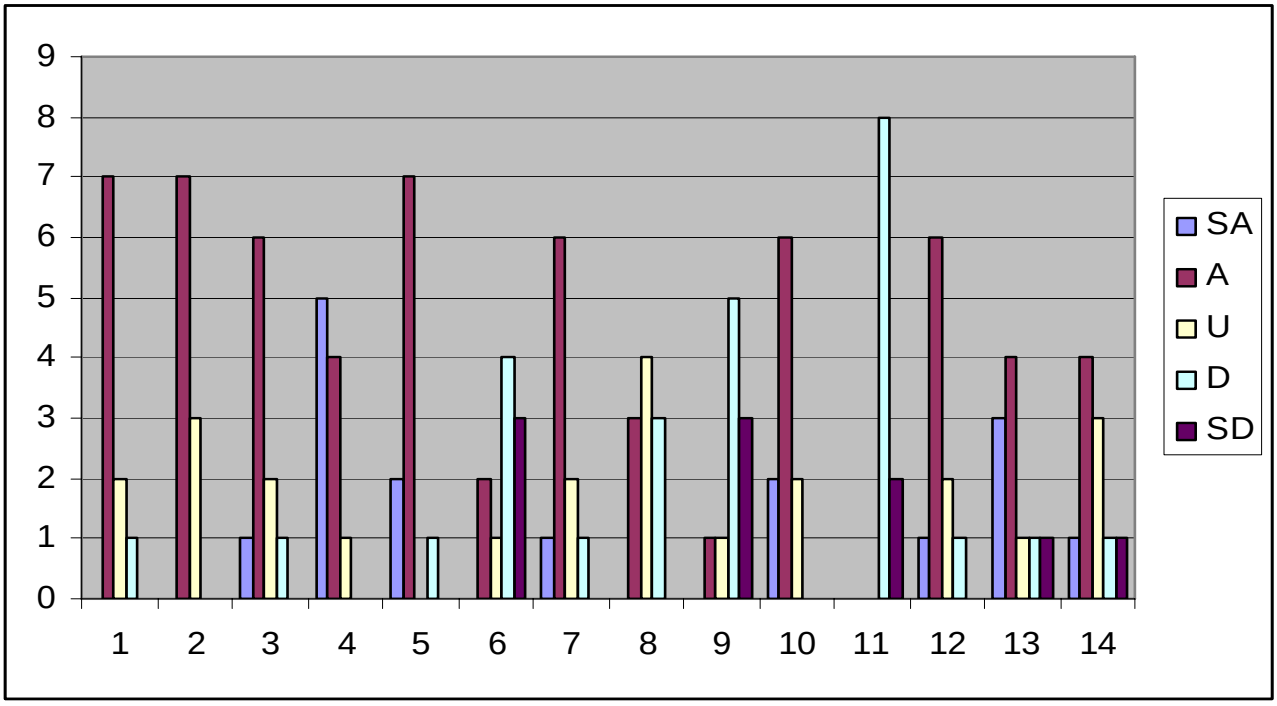
questions	SA	A	U	D	SD
1	1	3	1		
2	1	4			
3	1	2	2		
4	1	2	2		
5		1	4		
6	1		1	2	1
7			1	3	1
8		3	1	1	
9	1		2	1	1
10	1		2	1	
11	2	2	1		
12		3	1	1	
13	2	3			
14	1		4		

Pilot case 3 (4 respondents)



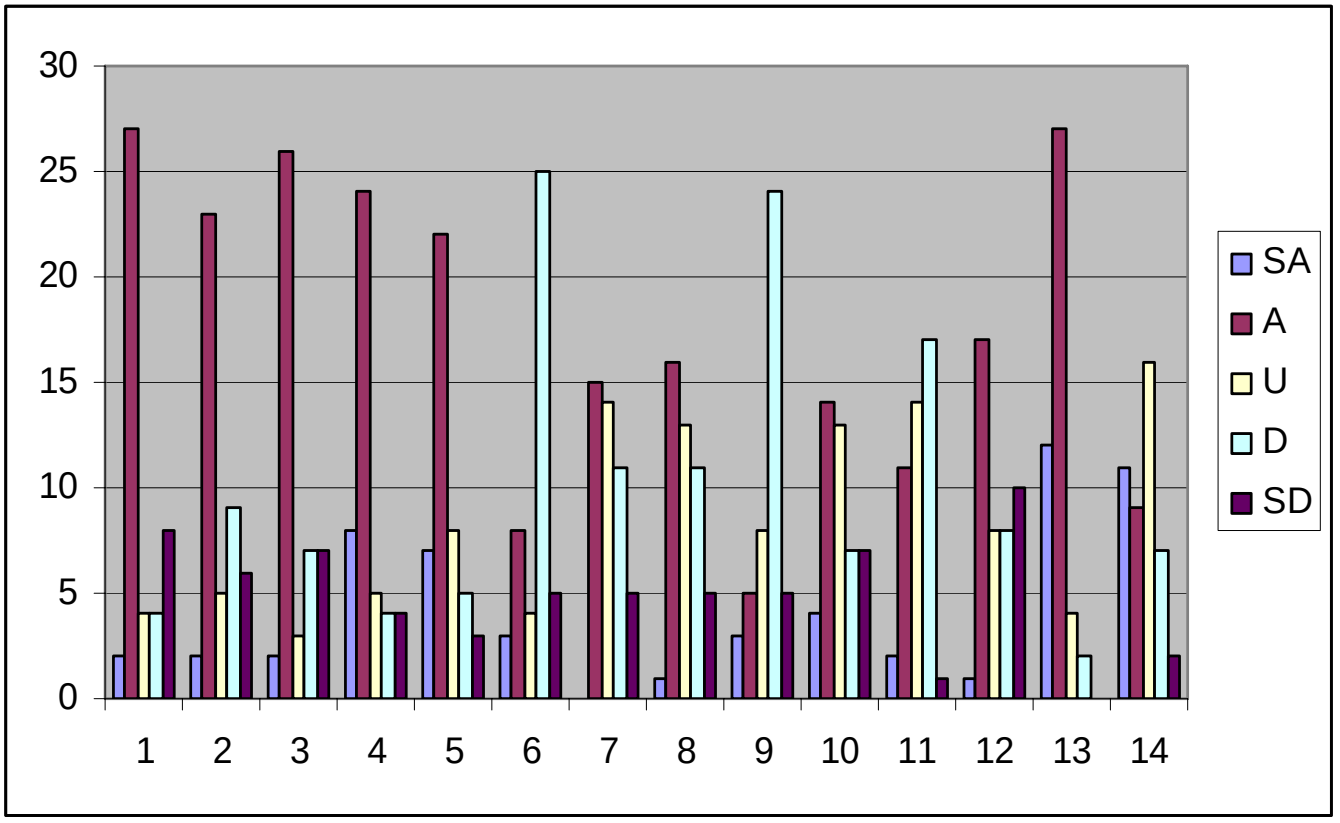
questions	SA	A	U	D	SD
1		4			
2		3	1		
3	1	2	1		
4	1	3			
5	1		2	1	
6	1	1	1	1	
7		1		3	
8		2	1	1	
9		2		2	
10	1	1	1	1	
11		3		1	
12		3	1		
13		1	3		
14		1	3		

Pilot case 4 (10 respondents)



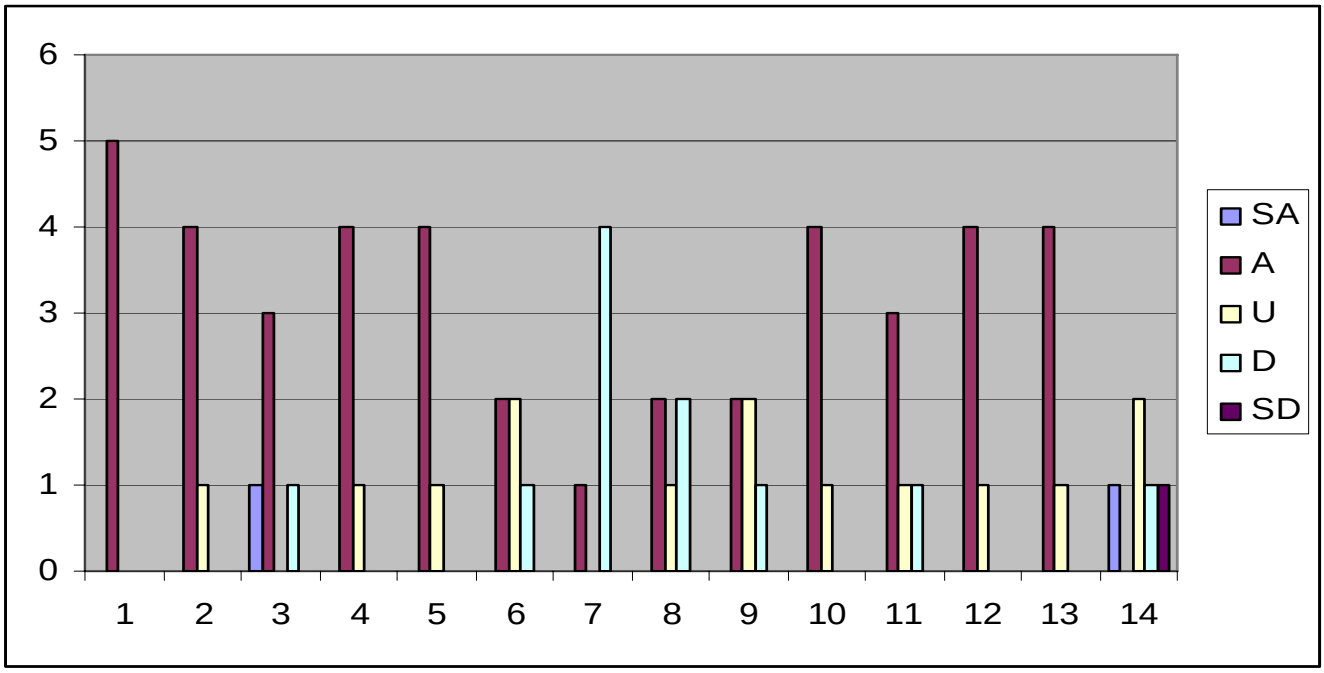
questions	SA	A	U	D	SD
1		7	2	1	
2		7	3		
3	1	6	2	1	
4	5	4	1		
5	2	7		1	
6		2	1	4	3
7	1	6	2	1	
8		3	4	3	
9		1	1	5	3
10	2	6	2		
11				8	2
12	1	6	2	1	
13	3	4	1	1	1
14	1	4	3	1	1

Pilot case 5 (45 respondents)



questions	SA	A	U	D	SD
1	2	27	4	4	8
2	2	23	5	9	6
3	2	26	3	7	7
4	8	24	5	4	4
5	7	22	8	5	3
6	3	8	4	25	5
7		15	14	11	5
8	1	16	13	11	5
9	3	5	8	24	5
10	4	14	13	7	7
11	2	11	14	17	1
12	1	17	8	8	10
13	12	27	4	2	
14	11	9	16	7	2

Student focus group (viewing a range of sequences - 5 participants)



questions	SA	A	U	D	SD
1		5			
2		4	1		
3	1	3	1		
4		4	1		
5		4	1		
6		2	2	1	
7		1		4	
8		2	1	2	
9		2	2	1	
10		4	1		
11		3	1	1	
12		4	1		
13		4	1		
14	1		2	1	1

Appendix 6
Reusability focus group interview guides and pro-forma (June 7th and July 9th 2007)

A. June 7th Interview Guide

Design for IBL

- A potential fit between LAMS as design interface and way you design for IBL?

Reusability

- Having seen the IBL LAMS sequences: are they 'reusable' for your own practice and if so in what way?
- Reuse of LAMS sequences in general? Does LAMS encourage reusability?
- (How) do you normally reuse activities/materials in your teaching? Sources? Triggers for decision to reuse? What kind of activity material are you happy to reuse?
- Issues for you, regarding reusability (constraints, challenges)?

Sharing

- Value of repository of IBL LAMS sequences?
- Format of such a resource? Search options? What would you look for?
- Willing to share own IBL LAMS sequences with others? Any issues/constraints?
- (How) do you normally share learning designs? With whom? What (if anything) do you get out of this? If not, what are the constraints?
- Other (non-LAMS) formats for sharing IBL practice (e.g. cases)?

B. July 9th Pro-Forma

Design

1. How might you use LAMS to design learning activities in your subject area, or across subjects?

2. Do you see LAMS as suitable for enabling the design of *inquiry-based* learning in your subject area, or across subjects?

3. Are there any specific features of LAMS that you would identify as useful/less useful? Are there any features that you'd like to see that are not yet available?

Reuse and Sharing

4. What experience do you already have of 'reusing' learning designs, created by others, for your own teaching or support for learning?

5. Can you see benefits of having access to LAMS sequences designed and used by others, as support for your own (or others') design for learning, whether online or face-to-face?

6. What factors do you think would lead you to ‘reuse’ (adapt or adopt) sequences for your own teaching?

7. Would you look for sequences in your own subject area only, or would you also look at sequences in other subject areas?

8. Can you see benefits of having ‘generic’ sequences in inquiry-based learning made available to you (i.e. sequences designed specifically to illustrate different activity-patterns in inquiry-based learning)?

9. Are there any specific sequences that you have seen today, that you would envisage reusing (adopting, or adapting, for your own use)? Which are they, and why are they suitable?

10. If you were to use LAMS for your own teaching, would you be willing to make your sequences publicly available for reuse?

11. What particular constraints/issues do you see, regarding reuse and sharing of LAMS sequences?

C. July 9th Focus Group Interview Guide

Follow up pro-forma questions and invite sharing of responses in exploratory group discussions.

Appendix 7
Pilot implementation 'Theory of Change' impact evaluation framework (example)

Current situation	Resources/enablers	Activities	Desired outcomes
What is the current situation?	*What is needed in order to do the activities?*	*What steps need to be taken to achieve the desired outcomes?*	*What are the desired outcomes?*
Lack of engagement or participation in class by a large cohort of overseas postgraduate students with relatively weak English language skills. Feedback from students has suggested a need for a 'virtual learning' session in the class.	A reliable, robust and stable LAMS system in place. Adequate support from the DeSILA project team, including pedagogical training on effective, creative and interesting ways to design LAMS sequences. Access to database of LAMS sequence examples and LAMS reusable resources (e.g. images, sound files etc).	Implement LAMS sequences in class. Tutor monitors students' engagement and participation.	**Students** Students' easy understanding of and engagement with the LAMS system in class. Students motivated to continue with LAMS sequences out of class. Students' general understanding of [the topic] is enhanced through the LAMS activities. Increased participation and engagement of cohort of students. **Tutor** Reuse of LAMS sequences in future sessions and courses with similar cohort of overseas students based on positive feedback.

Appendix 8 DeSILA Project – a 'Theory of Change' overview

Current situation (May 2006)

What is the current situation?

1. At the University of Sheffield
1.Strategic commitment at institutional level to inquiry-based learning (IBL).
2. Development programme promoting creative use of ICT in IBL in arts and social sciences disciplines (CILASS).
3.Growing use of WebCT in these disciplines.
4.Activity-centred design identified as key element of IBL.
5.Limited sharing/reuse of designs for IBL.
6.Limited context-specific knowledge of how staff conceptualise the use of ICT in IBL; how they design for IBL using ICT; practitioner motivations/requirements for reuse.
7.Limited strategic engagement with open source learning technology at institutional level.
8.LAMS identified as having potential to stimulate activity-focused pedagogical development for IBL, and sharing/reuse of IBL practice, in arts and social sciences disciplines and beyond.

2. Beyond the University of Sheffield
1.A need for greater understanding of how practitioners conceptualise and approach design for learning, including in relation to IBL.
2.A need for resources (learning designs, case examples) and context-sensitive guidance to support practice and technical development in design for learning, including for sharing and reuse.

Resources / Enabling factors

What is needed in order to do the activities leading to the desired outcomes at the end of the DeSILA project?

3. Stimulus and effective support for LAMS experimentation.
1.DeSILA strongly promotes LAMS to CILASS community and recruits staff for 25 implementations.
2.LAMS platform is technically robust and usable for IBL.
3.DeSILA encourages a variety of modes of use of LAMS.
4.DeSILA supports (re)use with high quality training, resources and other forms of pedagogical and technical help.

4. 'Design for learning' expertise.
1.Expertise in pedagogical and technical user support aspects is provided.
2.External support (JISC) is accessible and high quality.

5. DeSILA adopts appropriate research and evaluation methodology (primarily qualitative).
1.'Situated' analysis of staff understandings and practices in design for IBL.
2.Impact analysis of (re)use of LAMS.
3.Monitoring of organisational and technical issues.
4.Exploration of LAMS-WebCT integration.
5.Analysis of LAMS learning designs.
6.Exploration of reuse requirements.

6. Effective stakeholder engagement and partnerships.
1.Existing positive relationships between CILASS, LDMU & IBL practitioners.
2.Effective communication with senior managers, academic departments and Library.
2.Feedback to LTDG.
3.Student partnership via CILASS Student Ambassador network.

7. Effective management of publicity and dissemination.
1.Tailored to different stakeholder groups and project stages.

Activities / Processes

What steps need to be taken to achieve the desired outcomes at the end of the DeSILA project?

8. Academic staff in arts and social sciences, and in the Library, experiment with using LAMS for IBL.
1.25 'embedded' LAMS IBL implementations are carried out.
2. Staff adopt a variety of modes of (re)use of LAMS (e.g. design of face-to-face IBL; design of IBL supported by other tools; design of sequences for part and whole of modules);
3.Staff use LAMS in blended and distance modes (including in CILASS 'collaboratories');
4.Staff use LAMS for inquiry-based information literacy activities;
5.Staff use LAMS in conjunction with WebCT Vista 4.
6.Staff are willing to allow sharing and reuse of the learning designs they create.

9. Core team further develops its 'design for learning' expertise.
1.Quality of pedagogical and technical support activities is monitored (user satisfaction) and, where needed, improved.
2.DeSILA team members take part in relevant external networks, including other D4L projects, LAMS user groups.
3.DeSILA takes advantage of assistance provided by D4L support project, input of external experts via Steering Group.

10. Understandings and practices relating to designing for IBL are explored, and effectiveness and impact of LAMS implementations are evaluated.
1.Teaching staff develop ToCs and performance indicators for their LAMS projects, with DeSILA support.
2.Research data on 'design for learning' understandings and practices are collected and analysed.
3.Teaching staff and students provide on-going and post-implementation evaluation feedback, and feedback on reuse.
4.Organisational and technical issues are recorded.
5.Conceptual framework for design for learning in IBL is developed.
6. DeSILA research/evaluation is informed by work in wider field (e.g. issues arising from previous LAMS evaluations).

11.The institution engages strategically with DeSILA project issues.
1.Staff with responsibility for strategic development in learning and teaching at institutional level participate in DeSILA.
2.DeSILA findings and recommendations are reported to LTDG and used to inform on-going strategy and development.

12. DeSILA is well publicised and makes outputs widely accessible to internal and external stakeholder groups.
1.DeSILA feeds into internal and external interest groups for LAMS and design for learning.
2.External users (e.g. academic and library staff, educational developers) choose to reuse DeSILA LAMS sequences.

Desired outcomes at end of programme

13. Students at UoS will have had positive experiences of using an activity-focused learning design tool (LAMS) for IBL.
1.Students will have undertaken LAMS IBL activities and will have achieved intended learning outcomes.
2.Students will have positive perceptions of the quality of their learning experiences and, specifically, that using LAMS 'adds value' to their experience of IBL.
3.Students will have positive perceptions of the quality of support provided for their use of LAMS.

14. Pedagogical practice for IBL at UoS will have been enhanced.
1.New approaches to IBL, using LAMS, will have been implemented in arts and social sciences disciplines and information literacy, illustrating a variety of modes of use.
2.Teaching staff will have had positive experiences of (re)using LAMS for IBL, judging that it 'adds value' to their practice, and will have enhanced their engagement with activity-centred design for learning.
3.The use of LAMS has strengthened IBL community at UoS, through development of a common practice and sharing of ideas and resources.

15. Capacity for supporting activity-centred design for learning at UoS will have increased.
1.Educational developers, learning support and technical support staff will have developed knowledge and expertise in the use and support of LAMS, including in conjunction with WebCT Vista 4.
2.Teaching staff will have positive perceptions of the quality of support provided for their use of LAMS.
3.There will be increased capacity within the institution in relation to the use of open source learning technology.

16. Design for learning practice will be better understood and LAMS use effectively evaluated.
1.The impact of using LAMS will have been evaluated in relation to learner outcomes; acceptability to practitioners; effectiveness and capacity-building for the organisation.
2.Research findings will offer enhanced understanding of how practitioners in the arts and social sciences conceptualise and approach design for IBL.

17. Strategic engagement with open source learning technology (specifically LAMS) will have been strengthened at institutional level.
1.The benefits of LAMS, as experienced by students, teaching staff and educational developers at UoS, will have been communicated to relevant UoS stakeholders.
2.Assuming that the benefits are significant, there will be plans to support LAMS roll-out across the institution.

18. An evidence-base and resources to support effective use of LAMS in IBL will have been generated and actively disseminated internally and externally.
1.DeSILA will have met its original objectives and produced and disseminated high quality outputs as specified in the project plan (learning designs, case studies, research analysis etc).
2.DeSILA will have contributed to the understanding and development of learning design practice in the sector.

Longer-term outcomes of programme

What are the DeSILA aims beyond the funded period?

19. Continued use and development of project outputs.
1.DeSILA learning designs and case studies will be used and valued by internal and external users.
2.DeSILA evaluation/research findings and recommendations will inform further use/development of LAMS and other learning design tools in the wider sector.

Longer-term impact on learning and teaching

What will be different for learning and teaching at UoS in the future as a result of the contribution of the DeSILA project?

20. Continuing enhancement of learning and teaching.
1.Activity-centred design for learning will become established as an integral aspect of IBL beyond the CILASS 'core' at UoS.
2.Students across all disciplines will have an enriched learning experience and staff will have enhanced their pedagogical practice and understanding.

21. UoS will benefit from a greater (and evolving) body of expertise, resources and evidence to support continuing excellence in IBL.
1.UoS will be able to provide enhanced services and support for educational development and practice in IBL.
2.Specialist 'learning design' and LAMS expertise in UoS will be fed into IBL development where appropriate, as a matter of course.
3.UoS profile and competitive advantage as regards the creative use of learning technology will be enhanced.

Appendix 9
DeSILA Final Evaluation Questionnaire
Learning Activity Management System (LAMS)

Note: 5 questionnaires were returned from 14 distributed. Quantitative responses are given below. Qualitative responses are integrated into the main report.

1. How easy did you find it to use LAMS, from a technical perspective?

Very easy 1 [ ] 2 [**2**] 3 [**3**] 4 [ ] 5 [ ] Very difficult

2. Did you use LAMS in conjunction with WebCT/MOLE (e.g. by embedding a link to LAMS into a WebCT module, or other means)?

Yes [**1**] No [**4**]

3. Did LAMS prove reliable as a system?

Very reliable 1 [**1**] 2 [**1**] 3 [**1**] 4 [**1**] 5 [**1**] Very unreliable

Please comment on any problems:

4. How helpful did you find the training/support resources that were available?

Very helpful 1 [**3**] 2 [**1**] 3 [ ] 4 [**1**] 5 [ ] Not at all helpful [ ] N/A

5. Overall, how helpful did you find technical advice, troubleshooting and support provided by the DeSILA team?

Very helpful 1 [**3**] 2 [**1**] 3 [ ] 4 [**1**] 5 [ ] Not at all helpful [ ] N/A

Please indicate any further help that you would have liked:

6. Overall, how helpful did you find pedagogical advice, troubleshooting and support provided by the DeSILA team?

Very helpful 1 [**1**] 2 [**3**] 3 [ ] 4 [ ] 5 [ ] Very unhelpful [ ] N/A

Please indicate any further help that you would have liked:

7. Did you find that using LAMS helped you to develop new ideas or approaches to inquiry-based learning?

Yes [**3**] No [**2**] N/A [ ]

8. During the DeSILA project, have you felt part of a 'community' of LAMS users within the University?

Yes [**1**] No [**4**]

9. On the basis of your experience, should the DeSILA project recommend 'roll-out' of LAMS to the wider University if (as is expected) integration is possible with WebCT/MOLE?

Yes [**3**] No [**1**] Maybe [**1**]

10. Would you personally use LAMS again if it continues to be made available in the University?

Yes [**3**] No [ ] Maybe [**2**]

11. If LAMS continues to be made available in the University, what form(s) of support do you feel should be provided? Please comment:

12. Are you willing to allow sharing and reuse of your sequence(s) via the public LAMS International website?

Yes [**2**] No [ ] Maybe [**3**]

13. DeSILA is committed to providing short 'case studies' of pilot implementations of LAMS to JISC as part of the evaluation report. We will shortly circulate to you a 'case' based on the evaluation data collected about your experience, for you to check and amend as appropriate. In principle, are you willing to allow this to be shared by JISC with the wider community of interest in design for learning?

Yes [**2**] No [ ] Maybe [**3**]

14. Please add any other comments here:

Appendix 10

Impact Evaluation: additional comments

The DeSILA project ToC (Theory of Change impact evaluation framework) was used as a point of reference for the writing of the project's final report and detailed information related to its indicators, given in the report, is not repeated here. The purpose of this document is to comment briefly on some key processes and outcomes of the project from an institutional perspective and what has been learned from the process of carrying it out.

The main value of the project at institutional level has been in enhancing the profile and understanding of the design for learning concept, in relation to IBL but also more broadly. While the project did not lead in the short term to institutional-level roll-out of LAMS itself, it has enabled clarification of requirements for support for design for learning and strengthened the CILASS focus on design in its on-going programme of enhancement and innovation. The CETL has developed a better understanding of the way in which practitioners conceptualise IBL and go about design, and their attitudes and requirements relating to sharing, reuse and pedagogical support. The DeSILA project is feeding in to the on-going, broader-based work of the CETL in its development of pedagogical planning and design resources for IBL (beyond the use of LAMS), and this is something of an unanticipated outcome. A further unanticipated outcome has been the identification of the concept of 'student as designer' in IBL – which we believe to be an important but as yet underdeveloped dimension of practice and theory in this context.

On the question of process: the DeSILA project set out to move almost immediately into relatively extensive, real-life user evaluation - that is, into multiple experimentations embedded into existing courses. Pilot users had some, but not a wide variety, of resources available to them to inform their practice, and design issues relating specifically to IBL with LAMS on the whole emerged during, rather than prior to, individual experimentation. At the same time, the project expended a great deal of time and energy attempting to recruit additional participants to pilot the software, with somewhat limited success for a number of reasons.

In the light of these considerations, an alternative (or future) development approach suggests itself, based on wider implementation and evaluation *preceded by* an initial research and development phase taken forward by a small group of IBL specialists (academic staff and educational developers, with technical support). This group would have a specific remit to explore and report on the use of a system, and collectively develop a range of exemplars reflecting different approaches - including, potentially, 'generic' sequences as well as subject-contextualised sequences - combined with pedagogical planning guidelines. Such a phase could then provide the basis for wider engagement of practitioners for real-life implementations. Bearing in mind the pattern of the academic year, such a project design might extend over a two-year period – year one: research and resource development, followed by year two: wider implementation.