EVALUATION OF THE PRACTITIONER TRIAL OF LAMS: FINAL REPORT

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Web sites

LAMS Trial:
www.jisc.ac.uk/project_lams.html

www.jisc.ac.uk/index.cfm?name=elp_lams

Learning Technologies Group:
www.oucs.ox.ac.uk/ltg/

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Executive summary

The LAMS practitioner trial ran from July 2004 to March 2005 and had the following aims:

1. Evaluate the use and suitability of LAMS as an activity-based e-learning tool across three post-16 educational sectors in the UK: Further Education (FE), Higher Education (HE) and Adult and Community Learning (ACL).

2. Provide JISC with recommendations for a) practitioners wishing to design and deliver e-learning activities using learning design and b) developers of supporting software, systems and standards.

The evaluation focused on the question *Does the use of a learning design tool such as LAMS support effective practice in designing for learning?*, where "effective practice" was defined in terms of i) LAMS' acceptability to teachers; ii) its enhancement of the learning experience and outcomes; and iii) the opportunities that it provides for teachers to reflect on, and share, their practice. To this end, the evaluation team analysed quantitative and qualitative data from two questionnaires, four visits to participants in their institutions, a workshop for participants held in January 2005, messages posted to the EPED-LAMS JISCmail list, and the LAMS sequences which a number of participants uploaded to the public area of the LAMS server.

Forty participants embarked on the trial, 75% of whom came from the HE and FE sectors. Participants were generally well acquainted with a range of different e-learning technologies and worked in a variety of roles, principally as teachers and/or e-learning advisors. Twenty-one participants reported back to us at the end of the trial, including 8 to whom the use of LAMS had been "cascaded" by colleagues or e-learning advisors. Thirteen of these had run, or attempted to run, a total of 14 LAMS sequences with learners.

In relation to aim 1 and the research question, our findings suggest that:

i) LAMS is capable of supporting a range of pedagogical approaches, in that designers can select those activities that match their preferred style. However, the lack of support for images and graphics can be a hindrance to the design of appropriate learning tasks.

   The adoption of LAMS within an institution would almost certainly entail an increased workload for teachers, but with time and experience this load could be expected to lessen.

ii) LAMS appears neither to have compromised learning outcomes in comparison with the existing learning environment nor to have resulted in dramatic improvements in achievement. However, using LAMS to raise the level of learning outcomes was not a prime consideration for practitioners. Rather, they perceived its benefits to lie in increasing learners' motivation and in encouraging participation by more reticent students.

   Feedback obtained directly or indirectly from learners suggests that some appreciated the independence and freedom to work at their own pace, while others did not like the linearity of LAMS sequences or wanted more direct feedback on their progress.

iii) Several participants engaged in some form of reflective activity either while designing a LAMS sequence or afterwards. However, while they recognised the importance of sharing their practice with others, technical and cultural barriers need to be overcome.

In addition, the findings enabled us to construct a comprehensive picture of the types of situations in which LAMS can support effective practice.

In relation to aim 2, our four principal recommendations to the JISC Steering Committee are:

1. Continue to host LAMS on a central server for a minimum of two years in order to enable practitioners to continue working with LAMS into the next academic year.

2. Consider the permanent provision of regional or national servers for use by those institutions who lack the resources and expertise to host LAMS (and other open source applications) themselves.

3. Support investigations into i) the learner's perspective on LAMS, ii) the administrative functions of LAMS, and iii) the technical issues involved in hosting LAMS locally. Ideally, i) and ii) should be preceded by rectification of the usability problems which were reported during the trial and are listed in the final report.

4. Investigate the measures that might be taken to reduce attrition among participants in similar longitudinal studies in the future, e.g. through funding them to take time out from their normal duties.

The report also includes a number of recommendations to three other interest groups: practitioners wishing to design LAMS sequences, the LAMS development team and developers of other learning design tools.

Contents

1. Introduction

This document reports on an evaluation of the practitioner trial of the Learning Activity Management System (LAMS), which was sponsored by JISC as part of the e-Learning and Pedagogy Strand of its e-learning Programme. The trial ran from July 2004 to March 2005 and had the following aims:

1. To evaluate the use and suitability of LAMS as an activity-based e-learning tool across three post-16 educational sectors in the UK: Further Education (FE), Higher Education (HE) and Adult and Community Learning (ACL).

2. To provide JISC with recommendations for a) practitioners wishing to design and deliver e-learning activities using learning design and b) developers of supporting software, systems and standards.

(JISC 2004a)

The evaluation itself was carried out by the Learning Technologies Group at Oxford University.

The background to the trial is the growing interest in learning design (or "designing for learning"), which Helen Beetham (JISC 2004c) has defined as "designing, planning, orchestrating and supporting learning activities as part of a learning session or programme". These activities may be mediated by information and communications technology (ICT), by traditional tools (i.e. paper and chalkboard) or by a combination of the two ("blended" learning), and they may take place in the classroom, outside it (e.g. distance learning) or in both settings alternately.

The concept of learning design is underpinned by three key principles, which Brittain (2004) identifies as:

1. A focus on activity, rather than content, as the heart of learning in general and e-learning in particular;

2. The structuring of such learning activities into a workflow, or sequence;

3. The ability to store such sequences for re-use and sharing among practitioners.

In his report into the state of learning design, and in particular the availability of software for lecturers to develop their own designs and sequences, Brittain (ibid.) concluded that the only piece of software capable of "persuasively [demonstrating] the concept of learning design in practice"[1] was LAMS, developed at MacQuarie University, Sydney under the leadership of Professor James Dalziel.[2] Therefore, the trial reported here focused solely on the use of this application. We should note, however, that the trial took place against the backdrop of the continued developments in other learning design systems (as monitored by the UNFOLD project[3]) and in the IMS Learning Design specification.[4] It also overlapped with a trial of LAMS in the secondary-school sector, conducted by the Centre for Research in Primary Science and Technology (CRIPSAT), University of Liverpool, under the auspices of Becta and the Specialist Schools Trust (SST).

Although the trial was intended to concentrate on the activity of learning design, with LAMS as a tool for mediating this process, the fact that the software was still under development rendered it highly likely that participants would also raise technical and usability issues. Therefore, the objectives of the trial addressed these matters in addition to the two aims stated at the beginning of this section. In summary, the objectives were:

1. To gather, collate and analyse data provided by participants order to elicit their perceptions of:

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[1] i.e. at the time of publication of his paper (May 2004)

[2] lamsinternational.com

[3] www.unfold-project.net:8085/UNFOLD

[4] www.imsglobal.org

1.1 Their practice of learning design prior to their experience of LAMS;

1.2 The overall applicability of LAMS to teaching in the post-16 sector across a range of disciplines, learning experiences and settings;

1.3 The functionality of LAMS in supporting the process of creating an activity sequence and running it with learners;

1.4 The impact of LAMS on their pedagogy;

1.5 The usability of the LAMS interface and any technical issues associated with using the software.

2. To seek feedback (where possible) from learners on their experience of LAMS.

3. To provide recommendations to the following groups:

3.1 JISC and the funding councils, regarding future support for LAMS in particular and the conduct of similar projects in general;

3.2 Practitioners, for guidance on using LAMS for e-learning activities with their students;

3.3 The LAMS development team, regarding desirable enhancements to the usability and functionality of LAMS;

3.4 Developers of other learning design tools, regarding the key requirements of such tools.

The remainder of this report presents the method adopted in the evaluation, analyses and discusses the results, and lists the recommendations to the above groups.

2. Method

2.1 Research question

For the purposes of the evaluation, the aims and objectives of the trial were encapsulated in a single research question:

Does the use of a learning design tool such as LAMS support effective practice in designing for learning?

where "effective practice" can be defined in three ways:

1. A process that is acceptable to practitioners in terms of their preferred approach to teaching and their available time, resources and competences;

2. A process that is effective for learners in terms of achieving the intended learning outcomes and promoting other aspects of learning such as motivation, engagement, enjoyment and general progression;

3. A process that offers practitioners a means of reflecting on their own practice and sharing that practice with their peers.[5]

This question was to be answered primarily through qualitative methods. Although some quantitative data would be gathered, we did not envisage conducting statistical analyses since participants would not constitute a random sample and numbers would be too small for formal tests to be meaningful. However, we were interested in making comparisons where any similarities or differences emerged across the three sectors represented in the trial.

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[5] For further discussion, see JISC (2004b) and Beetham (2004).

2.2 Evaluation timetable and tools

As noted in the Introduction, the LAMS trial ran from July 2004 to March 2005. Figure 1 summarises the stages and milestones in the trial, together with the principal tools of evaluation. These tools are described in more detail in sections 2.5 to 2.9.

Month	Milestones	Participant activity	Evaluation team activity
2004 June		Recruitment of participants & completion of pre-training questionnaire	
July	7th-8th: Main LAMS training at Kemnal College	EPED-LAMS mailing list in use	
August			
September	LAMS v1.0b6.1 becomes available on JISC's London server	Main period of design activity & phased completion of design questionnaire	
October			6th: Release of design questionnaire
November			9th: Meeting at SST, London 26th: Visit to practitioner 30th: Visit to practitioner
December			7th: Visit to practitioner 8th: Visit to practitioner Analysis of pre-training questionnaire
2005 January	11th: Workshop at Aston University		
February	2nd: London server upgraded to v1.0 25th: Source code released		
March	31st: Formal end of trial		24th: Visit to practitioner Analysis of design questionnaire
April	13th: Official launch of open source; LAMS installer released		6th: Presentation of early results at CAL 2005 Conference, Bristol Analysis of full data
May			14th: Submission of final report to JISC

Figure 1. Timetable of the LAMS trial and evaluation. Sources of data for the evaluation are underlined.

2.3 Participants

Participants in the LAMS trial were recruited through email invitations to established discussion lists, meaning that only individuals already actively interested in e-learning were approached. No fee was offered, but participants were told that they would benefit from access to the first LAMS server in the UK and from technical support in using the system. Each was required to submit an Expression of Interest form outlining details of their role, institution and how they intended to use LAMS with learners. This process was intended to ensure that participants were committed to using and evaluating LAMS, and that they constituted a representative spread of practitioners, contexts and types of use.

The majority of participants (34) were recruited in late June/early July 2004 and underwent a two-day training course in LAMS at Kemnal Technology College, Bromley. The remaining 6 participants joined the trial between July and November 2004 and either attended later training courses at Kemnal, were taught to use LAMS by colleague, or figured it out for themselves.

2.4 The LAMS environment

LAMS is written in Java and runs on the most common Web browsers, although Flash 7 is also required. The LAMS environment incorporates a visual authoring interface for teachers to design and create their learning sequences (Figure 2), a comprehensive range of individual and collaborative learning activities which can form the building blocks of a sequence (shown in the left panel of Figure 2), and a Monitor tool (see Figure 6 on page 16) through which teachers can track students' progress through an activity sequence.
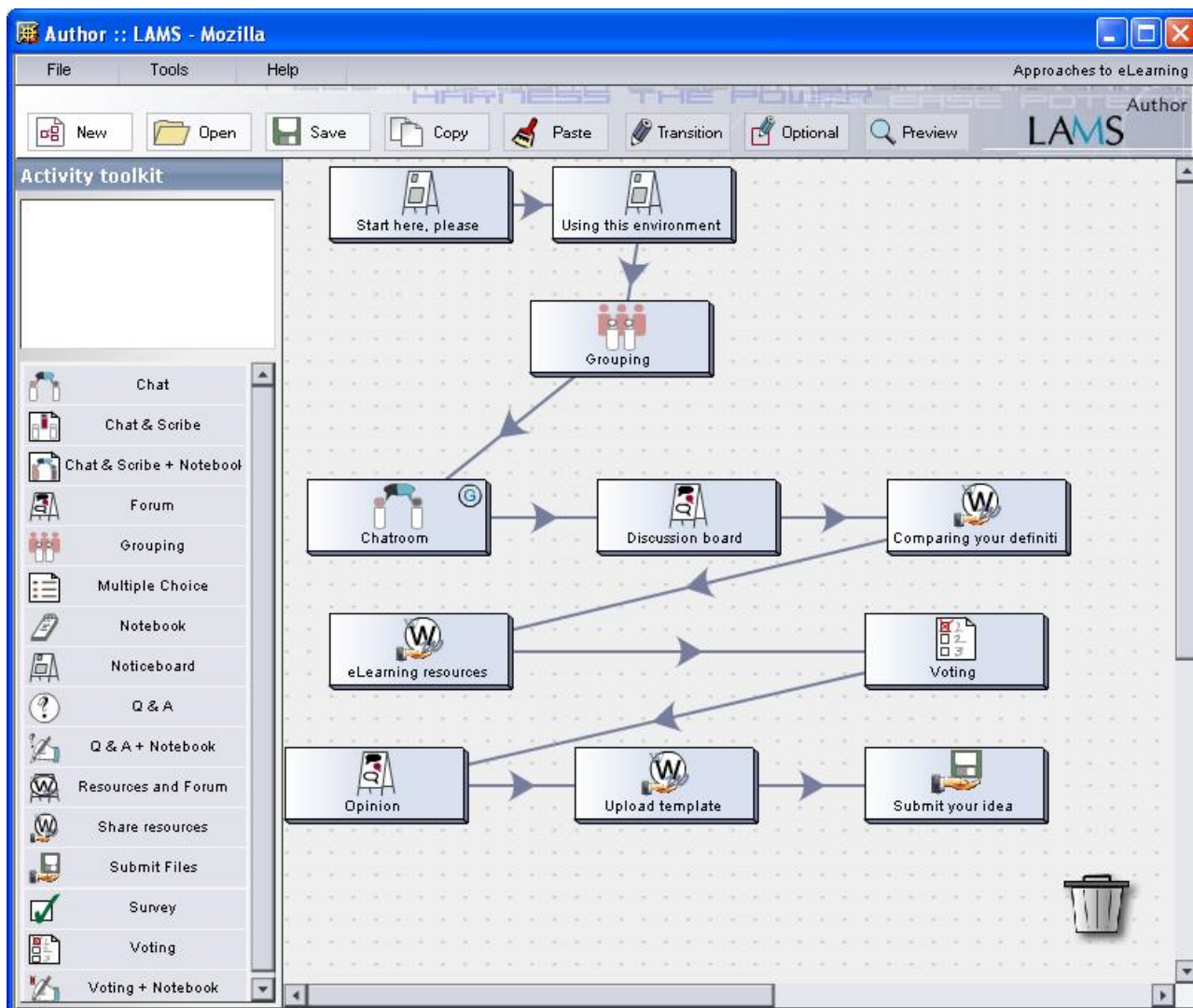
Figure 2. The LAMS Author interface, showing a sequence created by one of the participants.
The sequence is described in more detail in section 3.3.2 (with acknowledgements to Simon Walker, University of Greenwich).

Initially, participants logged into LAMS on the server at MacQuarie University, but in October they transferred to a dedicated server funded by JISC and hosted by the SST in London. LAMS v1.0b6.1 was used until February 2005, when it was superseded by v1.0. This version addressed a number of technical and usability issues raised by users over the preceding months and included the much-requested ability for authors to preview their sequences while they were developing them.

Three levels of storage were provided on the server for participants' sequences: i) private areas where each participant could keep their "work in progress", ii) a communal area for each institution, where completed sequences could be viewed and run by members of that institution only (provided they had LAMS accounts), and iii) a public area where sequences could be made available to all other participants in the trial.

Technical support was provided by London-based staff of LAMS International, who also set up accounts and passwords for the students who would be using the sequences.

2.5 Questionnaires

The two questionnaires — titled "pre-training" and "design" respectively — constituted the principal evaluation instruments. They were made available in Microsoft Word template format on the JISC LAMS Website.[6] Participants would download a template, complete the questions and email the document back to the evaluation team.

2.5.1 Pre-training questionnaire

The pre-training questionnaire was completed by each participant after they had been accepted onto the trial and before their first exposure to LAMS (which in most cases occurred on their training course — see section 2.3). They were designed to elicit further details about the participants, their attitudes and roles, the technologies with which they were already familiar and their reasons for involvement in the trial. Although partly intended as base-line data for participants' subsequent use of LAMS, this information was also expected to be useful in understanding the process of e-learning adoption more generally.

2.5.2 Design questionnaire

The design questionnaire was intended as a reflective log in which participants would record their decisions, actions and responses as they progressed through i) deciding on the course or module for which they would create a LAMS activity sequence, ii) planning the sequence and creating it in LAMS, and iii) running the sequence with a group of students. In a final section, they were invited to give feedback on their overall experience of using LAMS and the prospects for its future use in their institution. As an incentive, participants were informed that those who submitted their design questionnaires would be entered in a prize draw.

2.5.3 A note on the method of analysis

To facilitate analysis of each questionnaire, we collated the data in a spreadsheet. Multiple-choice and Likert-scale questions could be analysed quantitatively without any intermediate processing. However, in order to elicit a cohesive set of quantitative data from free-text responses it was necessary to categorise them. Categories were established on the basis of what respondents had actually written (i.e. in a grounded theory approach), rather than being defined beforehand by the evaluation team on the basis of expected responses.

In most cases, identifying common themes in the responses was a straightforward task. However, in several cases responses were initially unclear, and it was necessary to infer a person's intended meaning by drawing on knowledge of their institution and role and by examining the problematic response in the context of their other responses to the same question. For example, a number of people cited "accessibility" as a potential benefit of e-learning without elaborating what they meant by this term. Strictly speaking, "accessibility" refers to the need for an e-learning system to accommodate learners with disabilities. However, a holistic reading of these participants' questionnaires suggested that some of them had used the term to refer either to learners who are excluded from the "normal" classroom for other reasons or to the physical availability of the technology itself (in the learner's institution and/or home).

2.6 EPED-LAMS mailing list

Throughout the trial we monitored contributions made to EPED-LAMS, a JISCmail list set up in July 2004 in order to bring together the participants, provide them with technical support, keep them abreast of developments to the LAMS software (e.g. bug fixes and new features), notify them of forthcoming events and provide a forum for them to air and discuss issues and ideas associated with designing activity sequences in LAMS

2.7 Interviews and observations

The evaluation plan envisaged a programme of visits to participants in their institutions, where we would interview practitioners in depth about their approach to learning design and their experience of LAMS. We also hoped to have opportunities to observe LAMS in use by students

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[6] www.jisc.ac.uk/index.cfm?name=elp_lams

and thereby obtain feedback from them, since there was no other provision for direct contact with learners in the evaluation plan.

2.8 Meetings

Two meetings took place during the trial. The first, on 9th November 2004, was convened by the SST to discuss the forthcoming trial of LAMS in the secondary-school sector which it was sponsoring jointly with Becta. Members of the JISC LAMS evaluation team and some participants were invited to attend.

The second (and, for present purposes, more significant) meeting was a workshop specifically for the participants in the JISC LAMS trial, held on 11th January 2005 at Aston University. This workshop enabled participants to:

◆ Receive a progress report on the trial;
◆ Discuss, in groups, their experiences of designing and running sequences in LAMS;
◆ Listen to presentation from participants who had already used LAMS with their students;
◆ Explore, in groups, the requirements of an "ideal" learning design tool;
◆ Receive an update from James Dalziel on plans for the future development of LAMS.

2.9 LAMS sequences

The final evaluation tool was the collection of LAMS activity sequences which individual practitioners had uploaded to the public area of the LAMS server for sharing with the other participants. These were additionally analysed by the evaluation team in order to discern the different pedagogical approaches underlying their design and to determine the most frequently used learning activities and patterns of activities.

3. Results

3.1 Pre-training questionnaire[7]

As noted in section 2.5.1, the pre-training questionnaire was intended to capture base-line demographic information and to ascertain how practitioners already understood and carried learning design in advance of the introduction of a new system (i.e. LAMS), which had the potential to define the design process in new ways.

3.1.1 Demographic data

Questionnaires were received from 40 participants. Of these, 30 submitted their responses before attending the LAMS training course in July 2004 and 4 submitted their responses after attending the training course. A further 6 participants joined the trial between July and October 2004 and in most cases completed their questionnaires before being exposed to LAMS for the first time. An additional two participants who had been on the July course failed to return their questionnaires and appeared to take no further part in the trial. The distribution of respondents across the educational sectors represented in the LAMS trial is shown in Table 1. X-S (cross-sector) denotes institutions which come under more than one sector (e.g. FE + HE).

Table 1. Distribution of LAMS trial participants across educational sectors

	FE	HE	ACL	X-S	**All sectors**
No. of practitioners	15	14	6	5	**40**
No. of institutions: i.e. colleges and universities. Different departments or organisations within the same institution are counted separately	10	10	2	3	**25**
No. of agencies: e.g. JISC Regional Support Centres, WEA, NIACE and TechDis	2	2	4	1	**9**

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[7]This section is a shortened version of the *Analysis of the pre-training questionnaires* available on the LAMS trial Website.

The low numbers from ACL meant that it was possible to draw comparisons only between FE and HE. It should also be noted that the figure of 40 does not correspond to the total number of people actually involved in the trial, since a number of participants indicated that they planned to "cascade" the use of LAMS to colleagues.

In response to a request to define their role(s) within their institution, 25 participants classed themselves as teaching staff, 16 stated that they worked in an advisory capacity vis-à-vis e-learning, 6 had management functions, and 6 were involved in research or evaluation. Other roles included support (3) and staff development (1). Fifteen participants had two or more roles, chiefly teaching + advising or teaching + research.

3.1.2   Participants' experience of e-learning

A question asking participants to assess their overall experience in the use of e-learning technologies yielded a picture of a highly competent group, especially in the HE sector, as Table 2 shows:

Table 2. Levels of e-learning expertise among participants

Level of expertise	FE	HE	ACL	X-S	All sectors
Not experienced	0	0	0	0	0
Somewhat experienced	8	0	3	0	11
Experienced user	4	6	2	3	15
Very experienced user, developer or champion	3	8	1	2	14

In terms of setting, 37 participants had used e-learning in face-to-face environments, 23 had used it for online distance courses and 29 had been involved in the delivery of blended learning (i.e. both face-to-face activities and tasks performed outside the classroom). In terms of the e-learning technologies which participants had used regularly or in which they considered themselves experts, HE practitioners appeared to avail themselves of a much wider range of tools than their FE colleagues, as Table 3 shows.

Table 3. The types of e-learning technology which participants used regularly or in which they considered themselves experts (these types were predefined in the questionnaire)

	No. of people using technology of this type				
Technology type	FE	HE	ACL	X-S	All sectors
Web-based research	15	14	6	4	39
VLE	4	13	2	5	24
Course-specific Web pages	6	11	3	4	24
Discussion/bulletin board	5	12	4	3	24
Learning software/virtual tutorial	5	8	3	4	20
Computer-based assessment	5	10	1	2	19
Videoconferencing	3	4	1	3	11
Interactive whiteboard	2	3	3	3	11
Mobile or wireless devices	3	4	1	3	11
Streaming video/audio	1	3	1	1	6
Simulation/microworld	0	3	0	1	4
Average no. of technology types used per practitioner	3.3	6.1	4.8	6.6	4.9

The use of the World-wide Web as a research tool was almost universal; however, VLEs, discussion boards and computer-based assessment were concentrated in the HE sector.

3.1.3 Approaches to designing for learning

Two questions asked participants for their usual approach to designing for learning (i.e. how they planned, organised, sequenced and managed different learning activities, and how they structured students' access to learning materials), and for the resources and tools which they used to support that process. Only the 27 participants who had experience of teaching[8] responded to these questions. Table 4 shows participants' responses to the question that asked them to select which one of six statements most closely matched their usual approach, or to summarise their own approach.

Table 4. Participants' usual approaches to designing for learning

Approach	FE	HE	ACL	X-S	**All sectors**
Plan sequence of activities for each lesson	7	5		2	**14**
Prepare materials, but not detailed activities		1			**1**
Use pre-defined lesson plan (e.g. NLN)					**0**
Adapt session plan from another year/course					**0**
Work at pace to suit group	4	1	1	2	**8**
Allow session to develop in response to learners	1		1		**2**
Other approaches mentioned: ◆ Plan sequence + work at group's pace ◆ Develop curriculum to meet specific learner needs		1		1	**1** **1**
Total no. of responses from sector	**12**	**8**	**2**	**5**	**27**

Over half of the respondents actively prepared their lessons in some way (as shown in the first two rows), but they developed their own plans rather than following formally defined plans or re-using previous plans. Paying attention to learners' needs — primarily by varying the pace, but also responding flexibly to learners' needs and styles — was more a feature of FE (and possibly ACL, although the figures are too small to permit generalisations) than of HE.

Participants' free-text descriptions of the materials and tools that they use to support the design process fell into three broad categories:

◆ Source materials, primarily syllabi and skills or standards documentation.

◆ Software tools, of which the most commonly used were mind-mapping tools (10 cases), word processors and other office productivity tools (9), Web design and authoring tools (3) and course design tools such as CourseGenie[9] (2).

◆ Documents produced using the above tools: i.e. course plans, lesson pro-formas, reading lists for students.

3.1.4 Perspectives on e-learning: benefits, issues and technologies

The three questions eliciting participants' perspectives on different aspects of e-learning — the potential benefits, the enabling technologies and the issues in adopting it — required participants to formulate their own responses. This meant that we had to categorise responses according to the common themes emerging from them, using the process outlined in section 2.5.3. However, when analysing the benefits and issues it became apparent that an analytical framework was needed a) to provide an additional layer for grouping the numerous categories that had been identified and b) to enable us to map benefits to issues for the purposes of discussion. The framework selected for this purpose was the model of learning activity design developed by Helen Beetham (JISC 2004b). As Figure 3 shows, this model aims to align the

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[8] Some participants responded to this question even if they were not currently in a teaching role. However, we felt it was safe to assume that they had teaching experience on the basis of their responses elsewhere in the questionnaire or in personal communications.

[9] Connected Learning Ltd: www.coursegenie.com

three essential elements in design — learners, the environment in which they learn and the intended learning outcomes — with the teacher's overall pedagogical approach and practice.
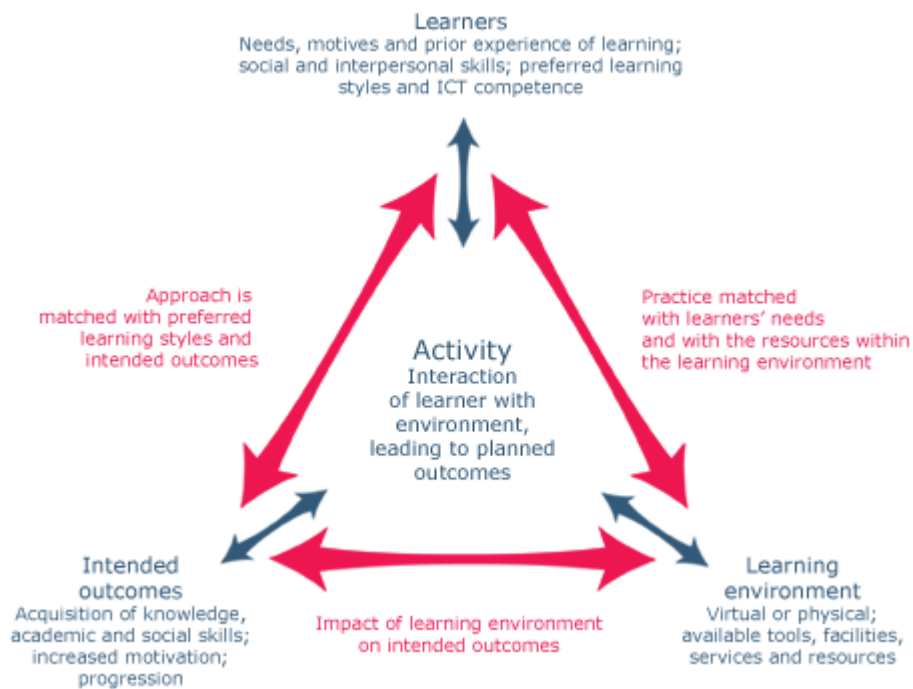
Figure 3. The model of learning activity design used in analysis of questionnaire responses (source: JISC 2004b)

The questionnaire asked participants to identify and rank what they thought to be the seven most significant benefits of e-learning, and to identify and rank seven issues that they took into account when considering the use of a particular e-learning technology, or e-learning activity, with a particular group of learners. For ease of analysis we focused only on those benefits and issues ranked 1 (most significant) to 3. For clarity, Table 5 on the next page presents aggregate figures from the different educational sectors for both questions, but indicates those sectors in which a particular factor was particularly prominent (i.e. where 50% or more of mentions came from practitioners in that sector). The table also includes two additional factors which emerged from the analysis but which do not feature in Figure 3: within-tutor factors and strategic (i.e. institutional) factors.

The majority of benefits and issues were perceived to lie in factors related to learners, the learning activity and the environment. However, the paucity of references to other elements in the learning design model, including intended outcomes, does not necessarily mean that participants considered them to be less significant, just that they might have felt that e-learning does not bring any specific benefits to these areas. Interestingly, some factors that were perceived to be significant benefits in principle — such as promotion of autonomy, support for "anytime, anywhere" learning and support for collaborative learning — did not feature so strongly when participants were considering implementing e-learning in practice. This apparent disparity will be explored further in section 5.2.

Table 5. Participants' perspectives on the key benefits of e-learning and the key issues in considering the use of e-learning for particular learners

Factors by category:	Benefit?	Consider it?	Specific issues raised by participants:
Learners:	**60**	**46**	
◆ Accessibility: accommodate learners with disabilities, also disadvantaged learners and those excluded from "normal" learning	9	6	
◆ Personalisation: accommodate differences in learning styles, abilities, pace etc. ***FE***	34	12	
◆ Motivation: promote engagement; greater participation by reticent learners	9	5	
◆ Autonomy/self-management: enable students to become active learners and take responsibility for their own learning	6	3	Are they mature enough to manage their own learning?
◆ Development of learners' ICT skills	2	20	Do they have adequate ICT skills?
Environment (tools and resources):	**54**	**67**	
◆ Availability of technology	5	27	Do they have access to ICT at home and/or at college?
◆ Support for "any time" and/or "anywhere" learning	26	3	
◆ Better availability of appropriate resources	6	27	
◆ Sharing, customisation and/or re-use of tools and resources	10		
◆ Improved quality of communication + possibility for novel forms of interaction	4		
◆ "Intrinsic" qualities of the tool: usability, robustness		10	
◆ Other	3		
Activity, including:	**30**	**15**	
◆ Support for collaborative learning	9		
◆ Enhanced learning experience for students ***HE***	17	14	
◆ Frequent/timely and effective feedback	2	1	
◆ Blurring the edges between formal and informal learning	1		
◆ Support for lifelong learning	1		
Intended outcomes	**3**	**0**	
Within-tutor factors	**8**	**6**	
◆ Tutor's practice	3	1	
◆ Tutor's approach	3	1	
◆ Tutor's skills and work patterns	2	4	Do they have adequate ICT skills?
Strategic factors: achievement of economies of scale	**2**	**2**	

Participants' suggestions for the technologies, or uses of technology, that can best deliver the above benefits of e-learning fell into four broad categories, as shown in Table 6. Once again, aggregate figures are given. Where more than half of the mentions for a particular tool came from a specific sector, this is indicated (e.g. ***FE***).

Table 6. The technologies that best support e-learning, according to participants

Categories of technology, with examples	*No. of participants mentioning at least one tool in category*
Interactive learning materials, e.g. ◆ Software: Web sites/CDs/DVDs ***HE*** ◆ Hardware: Interactive whiteboards ***FE***, mobile devices	19
Communication tools to support collaborative learning and building online communities, e.g. videoconferencing, discussion forums, chat rooms	18
Learning environments e.g. VLEs, LAMS	15
Tools/resources for information access, e.g. intranet or internet sites ***FE***	10
Course design tools	10
Assessment tools	3
Presentation tools	1
Tools aiding accessibility, e.g. voice files	1

3.1.5 Reasons for participation in, and expectations of, the LAMS trial

Participants' reasons for joining the LAMS trial were elicited by asking them to select one or more items from a pre-defined list, while they were given free rein in stating what they hoped to gain from the trial. We categorised their free-text responses and mapped these categories to the pre-defined set of reasons, as shown in Figure 4.
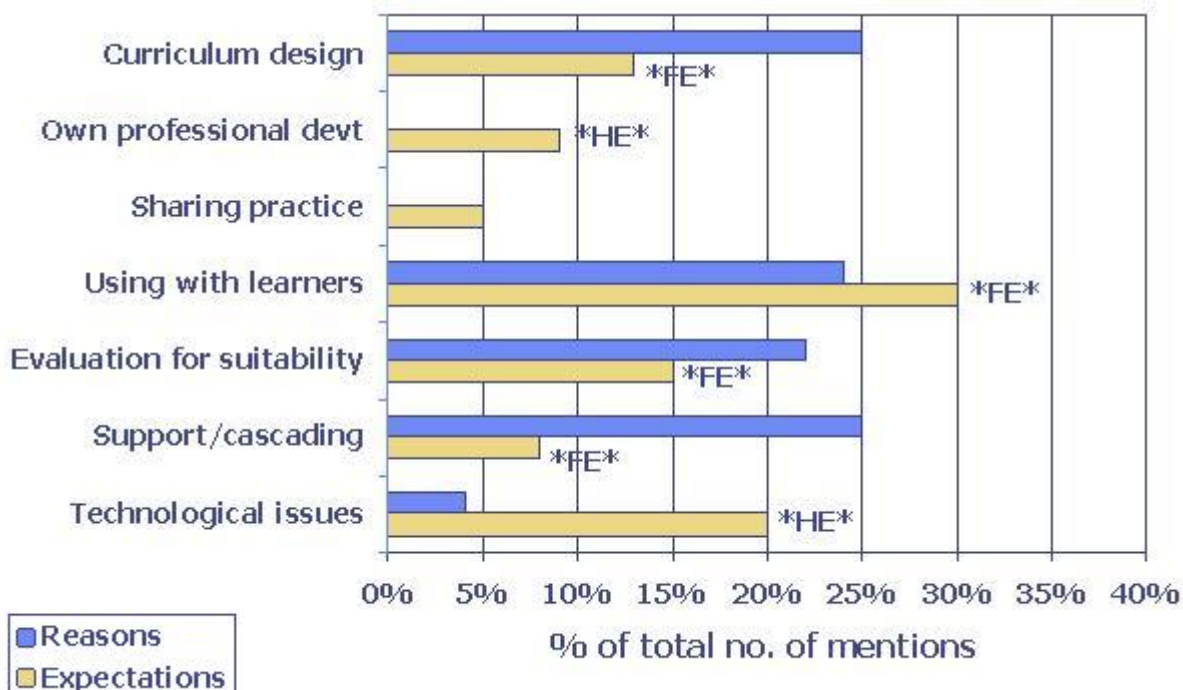

Figure 4. Participants' reasons for taking part in the LAMS trial and their expectations. Sectors accounting for the majority of mentions are highlighed in a similar manner to Table 6.

Generally, participants' reasons for joining the trial were evenly divided among the four pre-defined reasons: viz., using LAMS for curriculum/instructional design, using LAMS with

learners, evaluating LAMS for possible use by their department or organisation, and training or supporting others to use LAMS (cascading). The fifth reason — exploring the technological issues — was cited under the heading "Other" by participants who either had a technical role or an interest in such matters.

Expectations associated with the use of LAMS for curriculum design were: an improvement in one's practice of designing for learning, development of one's skills in relation to e-learning, and the sharing of practice with other participants in the trial. Expectations associated with using LAMS with learners focused on the enhancement of the learning experience; for example, through collaborative learning and/or support and monitoring by the teacher. Technology-oriented expectations included familiarisation with the IMS LD specification and an understanding of issues associated with the integration and interoperability of LAMS with VLEs.

3.1.6 Perceived benefits of LAMS

The questionnaire offered participants a list of seven possible benefits of LAMS and asked them to rate the relevance of each one on a four-point scale. Table 7 summarises the numbers of practitioners who considered each benefit to be either relevant or highly relevant to their situation (i.e. the two highest ratings):

Table 7. Potential benefits of LAMS considered relevant by participants

Benefit	No. of "relevant"/ "highly relevant" ratings
Develop learners' potential	34
Develop teachers' skills and repertoire	37
Raise standards and/or promote quality	29
Promote and support innovation	32
Make more effective use of time	23
Explore technical capabilities of the LAMS system	24
Contribute to research and development agenda	21

Two points stand out from these figures. First, LAMS' potential to develop participants' own skills was considered at least as relevant as its potential to bring benefits to the learners. This stands in contrast to participants' perspective on the benefits of e-learning in general (section 3.1.4), where within-tutor factors barely featured. Second, technically-oriented benefits (the bottom two rows) were seen to be relevant by over half of participants, including 13 of those who had described themselves as lecturers or tutors (i.e. non-technical roles).

3.2 EPED-LAMS mailing list

The mailing list proved a fruitful source of "work-in-progress" feedback throughout the trial, although the volume of contributions, 149, seemed quite low. Of these contributions, 72 were made by a total of 18 participants, including three individuals who were not full participants in the trial (i.e. they had not committed to completing the questionnaires or using LAMS with students), but were staff at participating institutions who had been accepted as members of the EPED-LAMS mailing list by the Project Manager. The remaining 77 messages were posted by those with an administrative function: members of the evaluation team, LAMS support staff and staff of LAMS International. Figure 5 summarises the monthly contributions to EPED-LAMS from these two main categories.
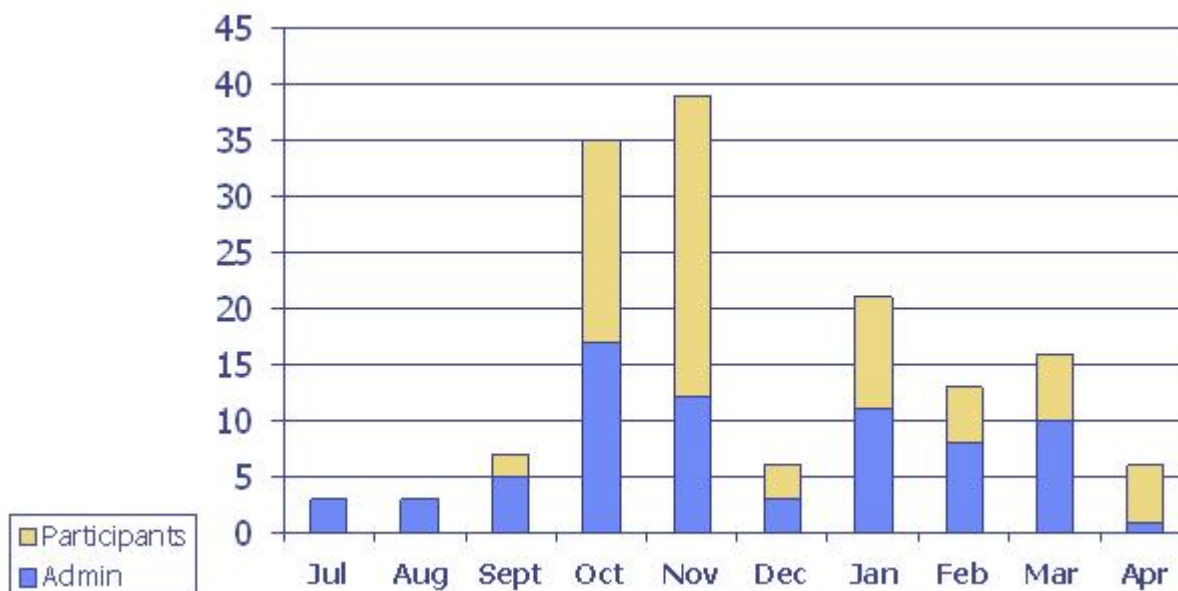
Figure 5. Summary of contributions to EPED-LAMS

The peaks in contributions by participants correspond to the upsurge in use of LAMS (October), discussion of the meeting at the SST on November 9th and discussion of the Practitioner workshop held in January.

Early concerns voiced by contributors to the list centred on the location of the LAMS server and the inconveniences associated with using the MacQuarie server until the London one was commissioned, after which these concerns ceased.

Once participants began to use LAMS with students (from October), a new problem arose: namely, how to upload user names into the system and create classes so that the sequences could be used with students. A procedure was agreed upon whereby participants would fill in an Excel spreadsheet with the relevant information and email it to the technical support staff, who would then set up the classes in LAMS. This worked reasonably smoothly but was not an ideal solution, and participants would have liked to have the ability to manage their own users (although in the existing version of LAMS this was a rather cumbersome operation).

A major inconvenience arose from the combination of two shortcomings in LAMS: a) the inability of authors to preview their sequences other than by saving each version and logging into it as a learner and b) the default behaviour of LAMS when saving copies of a sequence, viz. to name the new version by adding the prefix "Copy of" to the existing name. This resulted in a large number of redundant sequences on the public server prefixed in this way. The situation was eased somewhat by the advent of the Preview tool in early 2005, but the superfluous sequences remained on the server.

The increasing use of LAMS with learners led to more postings covering, inter alia:

◆   Design tips: e.g. the need to keep sequences simple and straightforward, and to provide introductory guidelines for students.

◆ Technical problems with LAMS: e.g. problems of referring to external Web sites that used frames and the unexplained "disappearance" of activities from sequences in Author mode.

◆ Requirements for future enhancements in LAMS: e.g. (early on) a "preview" facility.

Gradually, participants began to exchange more detailed thoughts on LAMS and to alert each other to the presence of new sequences in the public area of the server. There were even discussions of student interactions with LAMS inside and outside the classroom. As the trial progressed and the take-up of LAMS increased, an emerging concern was the future of the LAMS server after the trial. Understandably, practitioners expressed unwillingness to engage with LAMS in a serious way if their work was going to be redundant after April 2005. To allay these fears JISC agreed to make the server available until the end of July.

3.3 Interviews and observation

We visited four participants during the period of the trial. We had intended that interviewees would have sent us in advance the sections of the design questionnaire which they had completed so far, to serve as the starting-point for our questions. However, this did not happen, and so we designed a template of interview questions based loosely on the questionnaire.

3.3.1 Oxford Brookes University

Sector: HE
Date of visit: 26/11/04
Interviewee: Fawei Geng, Learning Technologist
Topic of LAMS sequence: Personal e-Portfolios for Teaching and Lifelong Learning (PETAL)
Access to learners: Conducted informal conversations after main interview.

Fawei had developed a short sequence of three activities as part of the PETAL project. The learners were all mature professionals working towards accreditation as Chartered Members of the Association for Learning Technology (CMALT), and the sequence centred on the asynchronous discussion of the CMALT guidelines. They started the sequence in the classroom, and were intended to complete the discussion, write individual learning plans for achieving CMALT membership and submit the plan via LAMS from their "home" institutions. However, technical problems associated with using LAMS hosted on a server at Oxford University (instead of JISC's London server) meant that many of them were unable to complete the sequence. Consequently, the learners did not have a positive experience with LAMS, although usability issues and the sense that LAMS was distracting them from their main task (i.e. developing their e-portfolios) were also contributory factors.

When questioned about the possible uptake of LAMS by the University as a whole, Fawei replied that he found it difficult to see the program being used in class, but that it might supplement lectures. He envisaged that links might be set up from the University's VLE to LAMS activity sequences.

3.3.2 University of Greenwich

Sector: HE
Date of visits: 30/11/04, 7/12/04
Interviewee: Simon Walker, Principal Lecturer in Education and Training[10]
Topic of LAMS sequence: Approaches to e-Learning
Access to learners: Observed and interviewed teacher-training students working with LAMS as both learners and authors.

Simon organised two optional LAMS sessions for trainee FE teachers. The sessions followed on from a lecture which formed part of the curriculum proper and were intended to "engage learners in a reflective process whereby they continuously honed an understanding of e-learning to a point where they could share their own ideas for using it within their own teaching context; from theoretical conceptualisation to real-world problem-solving." In the first session, they experienced LAMS as learners, working through Simon's "Approaches to e-

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[10] With acknowledgements to Russell Francis for permission to incorporate data from his interviews with the tutor and students in this section.

Learning" sequence (shown in Figure 2 on page 4). This session was modelled on one of his regular workshops, although the format of 3 hours face-to-face plus 3 hours online was shortened to 2 hours face-to-face and about one hour online. In the second session students had the opportunity to author their own sequences.

Simon described himself as adopting a "constructivist" approach in the design of his sequence: "people come with very different views about e-learning and […] you want to build on their culture, on what they already know and then they go out and compare their ideas — because there's no one single definition of e-learning. It's something which is negotiated and probably is different in different contexts as well." This approach is reflected in the structure of the sequence. After an introduction and orientation, students were divided into small groups and exchanged their definitions of e-learning in a Chat. The discussion then moved to a whole-class Forum, the purpose of which was to enable students (especially the weaker ones) to learn from each other and widen their understanding of what constitutes e-learning. Next, students were invited to examine the definition of e-learning provided on the Becta Website, to search the Web for other definitions and to share these definitions with each other through a Share Resources activity. They then moved on to a second Share Resources activity, where they evaluated a set of Web-based learning activities (including a simple maths exercise) and voted on which one they thought was best. The sequence then became asynchronous, with a Forum activity to allow students to continue their discussions in their own time. Finally, they were required to create a lesson plan by using a template downloaded from LAMS and using LAMS to submit the finished product.

Simon commented both during the interview and in a subsequent presentation at the LAMS Workshop (section 3.4) on the impact which designing and running the sequence had had on his own pedagogy. In particular, the range of activities available within LAMS "made me question my use of pedagogy —was I wanting them to chat, or complete a poll?". When running the sequence he was struck by the differing paces at which students progressed, especially one group who spent 40 minutes in the chat room: "Does this mean that I have never appreciated the real time needed by some learners to engage in topics that were of interest to them? This has proved to be a significant learning event for me". In terms of his management of the class, he admitted to initially feeling "disenfranchised" as a teacher until he had familiarised himself with LAMS' Monitor tool (Figure 6). This he found "very useful for seeing precisely where students are and potentially for analysing the reasons why they get stuck. [It is] particularly useful when students [are] working remotely and may require further scaffolding."

Overall Simon expressed considerable enthusiasm for LAMS' potential as an e-learning tool: "I've had the best experience with [it]". He noted, inter alia, its support for differentiated learning (i.e. accommodating learners of differing abilities) and its relevance to the current shift (exemplified in the FENTO[11] standards) in the teachers' role from content expert towards mediator of activities. However, he emphasised the importance of a blended approach, pointing out how the same activity may differ qualitatively when conducted in different media. For example, a face-to-face discussion may promote richer exchanges, while an online chat allows learners to review, and hence reflect on, what has been said. Moreover, the anonymity of the chat room may make it possible for students to discuss matters about which they might not want to speak in person.

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[11] Further Education National Training Organisation; see www.lifelonglearninguk.org.
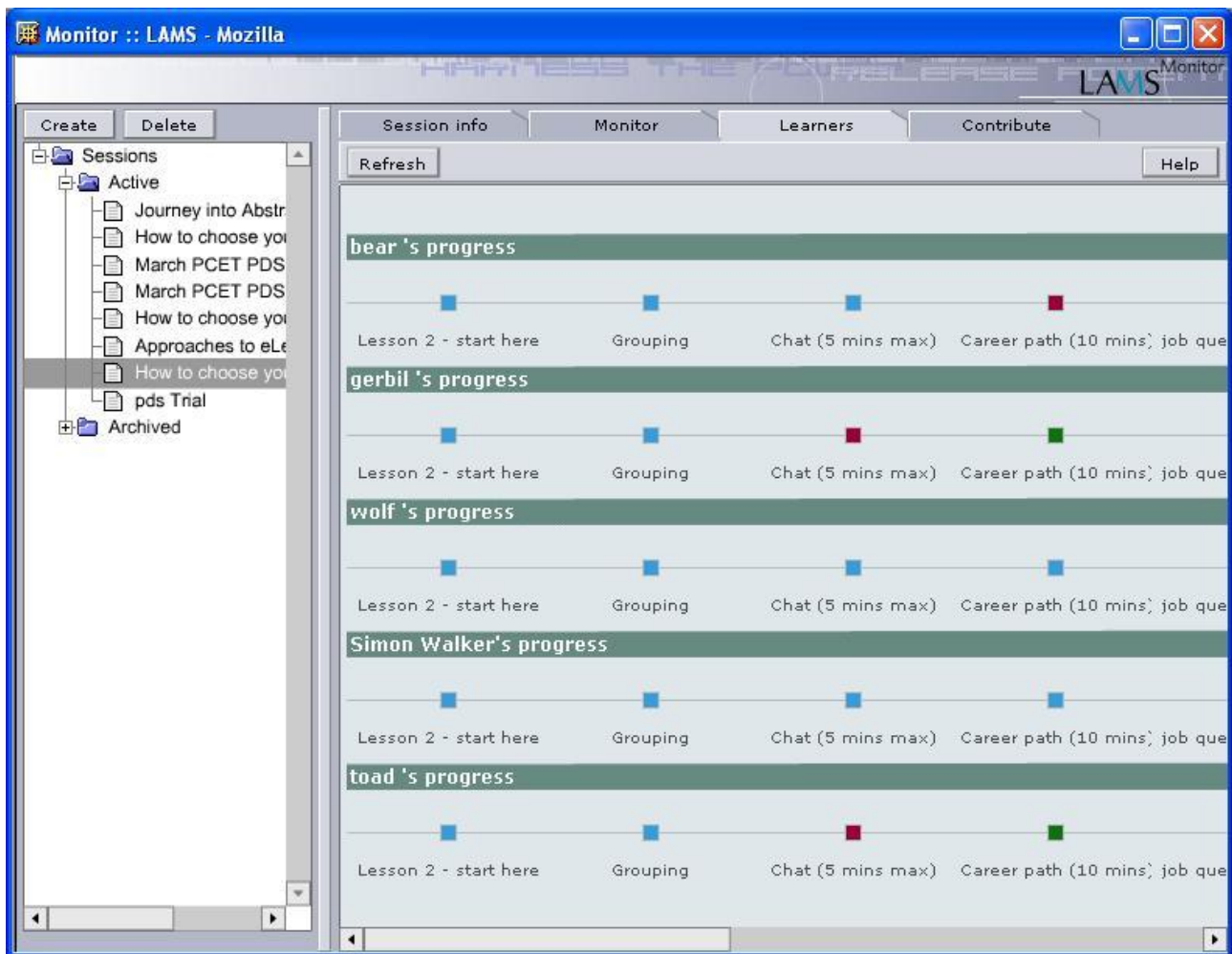
Figure 6. The LAMS Monitor, showing an experimental sequence on choosing a career, developed by Simon Walker subsequent to the interview reported in this section. Learners "Gerbil" and "Toad" are currently in the Chat activity, while "Bear" has moved on to an activity in which he explores his career path. "Wolf" and Simon himself appear to have raced ahead to an activity not shown on this screen. Note that Simon has suggested maximum times for some of the activities — perhaps in response to his experiences with the "e-learning" sequence.

Approximately eight students volunteered to participate in Simon's LAMS sessions, and five of them were interviewed while designing their own sequences in the second session. They were mature students and represented a variety of subjects, from numeracy to English, music and art. As learners, they were not immune to LAMS' novelty value, but they also appreciated the control which it gave them over the sequence (in particular, returning to previous activities where the software permitted), as well as the opportunity to discuss a particular conception (in this case, e-learning) with their peers and hence revise their own viewpoint.

Most of the students could see a role for LAMS in their teaching, whether for a specific group of learners (e.g. younger students who prefer doing individual activities at their own pace), for specific tasks (e.g. Web-based research), or for sheer convenience, such as the ability to chat without worrying about noise levels in the classroom, or to backtrack through the exchanges in a chat session. A particularly striking illustration of the benefits of this last feature was furnished by the experience of one student who had missed the classroom-based session and who worked through the session in his own time a few days later. LAMS duly assigned him to a chat session but, even though the other students had long since left the chat room, he was nevertheless able to read through their exchanges and, by reacting to their comments, develop his own ideas. It is worth quoting at length from his interview:

> "It was hard to pick out the definition [i.e. of e-learning] at first from the mass of conversation, so I was picking through it to find the places where someone pulled the group back and said 'OK, so we're saying that…' It was odd because it's like hearing a conversation in reverse: because I knew what the end was, I picked through it to find

the definition they'd come to and was reading back seeing the comments that had led towards it, so I was piecing together the flow of ideas that arrived at that definition. And then I also got down to doing it separately: [I] had a thinking space that you don't have otherwise, time for reflection and thinking through. I had a chat with myself, and used it for jotting down ideas.

[…] conceptually I was thinking what would I have been saying if I'd been in the chat room at the time so I think I really focused on what they were saying on the aspects I was interested in and tried to adjust the language to come up with my own definition.

[…] I think it was very valuable[?] in a way by missing a session in the classroom, the fact that it was recorded enabled me to catch up."

Both Simon and his students commented on a number of usability issues in LAMS. Simon himself noted that it took the equivalent of two days to develop and refine his sequence, partly because the absence of the Preview tool made it difficult to review his design and gain an overall feel for the flow of activities. Speaking from the learner's perspective, one student commented on the need for a clear introduction before starting the sequence while another referred to getting "a bit disoriented" in a Share Resources activity midway through the sequence.

3.3.3   Institute for Learning and Research Technology, University of Bristol
Sector: HE
Date of visit: 8/12/04
Interviewee: Ellen Sims, Learning Technology Advisor and Lecturer
Topic of LAMS sequence: What is a learning community?
Access to learners: Interviewed MSc students who had worked with LAMS as both learners and authors.

Ellen's sequence was incorporated into a module on VLEs within an MSc in e-learning and had a twofold purpose: i) to demonstrate a number of the tools available within LAMS and ii) to explore the concept of a learning community through participation in one. She started designing her sequence directly in LAMS, by adapting an exemplar provided by LAMS International titled "What is Greatness?" (Dalziel 2003). The sequence made use of, inter alia, an anonymous Q&A + Notebook activity to elicit students' initial conception of what a learning community might be, a Voting activity to elicit their preferences among a number of more formal definitions of the concept and a group investigation of online community Websites through a Share Resources activity.

All of her students came from overseas, and Ellen reported much higher levels of participation in online discussions than in their face-to-face equivalents. This may be because the anonymity of contributions gave confidence to students from cultures which place a premium on supplying the "right" answer. She had used the monitor to check on students' progress and in one instance had found it necessary to hurry one of the groups along — a recollection which prompted her to comment on the difficulty of striking a balance between encouraging discussion and ensuring that students cover all the required material.

The four students whom we interviewed had worked together as a team to produce a sequence titled "Christmas Customs in Cyprus", which they had piloted with their peers. They had found the drag-and-drop behaviour of the authoring interface easier to use, but considered the linearity of a LAMS sequence somewhat restrictive. Three of them were primary-school teachers and felt that it offered opportunities for reflection that otherwise might not happen: "Children don't normally think unless you force them to". However, they believed that the lack of a colourful, attractive interface and support for images would be a disadvantage in using LAMS with that age group.

Comparing LAMS with the VLE used at Bristol, Ellen felt that LAMS was better suited to managing large cohorts of learners, in terms both of directing them and of monitoring their progress. Interestingly, the students chose to use the VLE instead of LAMS for the discussion part of their "Christmas Customs" sequence, because in LAMS learners are unable to go back the Resources + Forum activity once they have moved on to the next one. They considered that while the communications tools provided by LAMS were more effective within the

classroom, those provided by the VLE were preferable for activities conducted outside class (i.e. asynchronously).

3.3.4   Bromley Adult Education College

Sector: ACL
Date of visit: 24/3/05
Interviewee: Sarah Sweetman, ILT Development Manager
Topic of LAMS sequences: Curriculum design; Information and Learning Technology
Access to learners: Received copies of feedback forms.

Sarah and her colleague Shirley Hamilton had prepared sequences to accompany a City & Guilds course (7407) for training teachers in FE and ACL. Shirley had intended to run two sequences on i) planning syllabi and schemes of work and ii) lesson planning with a group of eight students aged 30+, all but one of whom were familiar with using computers. The first sequence was structured around a classroom (synchronous) session, followed by a Forum in which students would discuss an assignment which they had been set over the Christmas holidays. They would then submit the completed assignment via LAMS. However, no students participated in the forum and their generally negative response to their classroom-based LAMS experience led to the cancellation of the second sequence. Their criticisms centred on usability aspects of LAMS, especially the Forum activity; however, they also felt that they had learned less using LAMS than they would have done in a face-to-face discussion.

Nevertheless, Sarah decided to go ahead with the sequence which she had planned for the e-learning segment of the course, since the use of LAMS was directly relevant to the subject-matter of the sequence. Her sequence included Q&A, Voting, Forum and Share Resources activities which ensured that all students participated (which was not always the case in face-to-face sessions), but the session was dogged by technical problems. Some of these were associated with the LAMS interface (for example, the window in which LAMS displayed an external Web-based quiz prevented users' access to buttons which were essential to completing the quiz), while others were to do with the equipment in the college's computer laboratory (Flash was not installed in some of the computers, and low screen resolution restricted the amount of information displayed). However, a number of tutors who were taking the 7407 course as students could identify a potential for using LAMS in their teaching; their subjects included creative writing, Spanish and ESOL.

Sarah had chosen not to make her sequence generally available on the LAMS server, perhaps through modesty but also because she felt that it was for "rather a specialist topic, not something that anyone could use as a freestanding object".

Sarah summarised the challenges facing the deployment of LAMS in her college as follows:

◆   General lack of use of technology by fellow-tutors: she confessed herself to be "horrified" by their continued use of flipcharts and OHPs.
◆   The question of payments to tutors for creating their courses. Many of them are paid by the hour, and would therefore need additional funding to convert existing courses into LAMS sequences.
◆   Resistance among students to online distance-learning courses.
◆   Uncertainty over the long-term future of LAMS: "The last thing I want to do is potentially excite tutors about this and then say to them 'Well sorry, you're not going to be able to use this because we can't offer it'".
◆   Limited resources for IT support, together with a very limited number of courses for which LAMS would be suitable, mean that it is unfeasible for the college to host LAMS on its own server. Rather, access would be needed to a server hosted by an external agency, perhaps by the JISC RSC.

Even so, Sarah felt positive that LAMS could have a place in ACL, and thought that the chances of successful deployment could be facilitated through, inter alia:

◆   Integrating it in new courses rather than adapting existing ones, in order to minimise the overhead in, and hence the additional costs associated with, the learning design process.
◆   Introducing it to students at the start of the course as a tool that will be used at various points during their studies, rather than springing it upon them at the moment of first use.

3.4 LAMS Practitioner Workshop[12]

The workshop on 11th January 2005 was attended by about 25 participants, together with the evaluation team. The principal data was gathered from i) the two sessions in which participants met in small groups, each of which was followed by a plenary where rapporteurs summarised each group's discussion, and ii) the presentations by four practitioners who had used (or were ready to use) LAMS with their learners.

3.4.1 Group session 1: Designing for learning

In the first group session, participants considered the general process of designing for learning and the use of LAMS as a particular tool for creating sequences of learning activities. It emerged that participants normally created course or lesson plans in one of two ways:

a) "Chunking" the syllabus into manageable parts.

b) Devising a metaphorical "bag" of resources from which they would draw to meet the needs of a particular set of students and piece of subject-matter.

The effect which LAMS might have on their practices in this respect included stimulating them to think about the structure of their courses/lessons, and to reflect on their pedagogy. For example, one lecturer commented: "[LAMS] makes me think about *why* I want [the students] to do something. 'How can I justify this?'" LAMS was also praised for enabling practitioners to visualise their learning designs.

Reasons for choosing to use LAMS as a learning design tool included its potential for:

◆ Supporting activity-based learning in a way which is easier than in face-to-face situations.

◆ Promoting collaborative learning. One practitioner noted that students need to develop skills in collaboration since this is the way in which most people actually work. Another commented on the importance of collaborative learning among disabled students, many of whom relate more easily to adults than to their peers.

◆ Promoting autonomous learning. Students need to make a transition from teacher-directed to self-managed learning as they move from school to university, and it was felt that LAMS may have a role in scaffolding this process.

◆ Giving students an insight into the real purpose and process of learning; i.e. that it is not merely a matter of getting the "right" answer.

◆ Obtaining the sort of feedback from students which can tell the teacher whether active learning is really taking place.

◆ Fostering collaboration between staff, including sharing learning activity sequences.

The perceived strengths of LAMS for supporting designing for learning included its ease of use, its benefits for beginning teachers and the flexibility to deliver both short chunks of learning and extended sequences lasting over several weeks. Its principal current weakness was considered to be the difficulty in accommodating differing abilities and learning styles.

Reflecting on the possibilities and issues associated with the re-use of learning designs, participants identified three distinct contexts in which re-use might occur:

◆ Using, with or without modifications, sequences created by others.

◆ Re-using one's own sequences, either with different classes within the same cohort, or with different subject matter, or over time (i.e. in response to changing curriculum requirements, resources etc.).

◆ In the case of students, re-doing a sequence for revision.

Issues associated with re-use included:

◆ Problems of transferability, e.g. across institutions and sectors.

◆ Problems of scaling, e.g. differing class sizes.

◆ The need to attach "metadata" to a learning sequence.

◆ The need to be able to "grade" sequences according to quality etc.

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[12]This section is a shortened version of the *Workshop summary* available on the LAMS Trial Website.

3.4.2 Group session 2: The "ideal" learning design system

In this session, participants suggested many specific enhancements to LAMS, a number of which were either envisaged or were already being developed, as James Dalziel reported later in the workshop.

Desirable features of learning design systems in general included:

◆ Interoperability with other learning environments, e.g. compatible file formats.
◆ "Single sign-on": logging into one system should automatically give the learner access to the other systems integrated with it and which he/she is authorised to use.
◆ Integration with mobile technology, especially for data capture during fieldwork.
◆ The ability for learners to create and maintain e-portfolios.

These and other features mentioned are included in the recommendations in section 5.

3.4.3 "LAMS in the field": Reports from practitioners

Four short presentations were given by practitioners who had used LAMS with students. Since the first two practitioners (Simon Walker and Ellen Sims) had already hosted visits from the evaluation team, their reports are not summarised here and readers are referred to sections 3.3.2 and 3.3.3 instead.

Simon Wild, Bromley College (FE), had created a remote learning environment for students on a Motor Vehicle Studies course who have jobs and so find it difficult to get to the weekly sessions at the college. He had developed a sequence to teach the Fuel Injection Pressure Testing module, which ran for 7-8 weeks (i.e. 15-20 hours). Simon deliberately restricted the number and range of activities so as not to confuse the students. Despite technical problems, one group of students had successfully completed the sequence, but Simon stressed the importance of having a "Plan B" in case of technology failure.

Tünde Varga-Atkins and Terry Russell, CRIPSAT, University of Liverpool (HE), had created (though not yet used) an "Introduction to formative assessment in science" for use in teachers' INSET. They hoped that it might serve as a generic sequence for training teachers in assessment skills.

3.5 Design questionnaires

The purpose of the design questionnaire was to act as a reflective log for participants to record their experiences with LAMS as they progressed through the trial. It was clearly impossible to ascertain whether they completed each section of the questionnaire at the appropriate time, or whether they completed the whole questionnaire retrospectively in a single sitting (in which case the reporting of expectations might be influenced by the hindsight of experience), but we must nonetheless assume that questionnaires were completed on a staged basis.

3.5.1 Overview of respondents

Questionnaires were returned by 21 participants, who had planned, designed and/or run LAMS sequences as shown in Table 8. One HE participant designed and ran two sequences; hence the figure of 22 for the number of planned sequences:

Table 8. Respondents to the design questionnaire and their progress in designing LAMS sequences

	FE	HE	ACL	X-S	**All sectors**
No. of respondents	6	6	7	2	**21**
No. of courses or modules within courses for which a sequence was planned	6	7	7	2	**22**
No. of LAMS sequences created by respondents	6	7	3	2	**18**
No. of sequences run (or attempted) with learners*	5	6	2	1	**14**

* One sequence was started but was abandoned

The number of respondents was thus only just over 50% of the number who had returned pre-training questionnaires. A substantial proportion of them (8) were in fact practitioners to whom

LAMS had been "cascaded" either by the representative of an agency (e.g. the WEA, which spawned 6 new participants in the ACL sector) or a colleague within the same institution. Reasons for the low return rate from the participants who had completed the pre-training questionnaires will be explored further in section 3.5.8.

The marked fall-off from those who planned a sequence through to those who succeeded in running one with learners can be attributed to a number of factors. These included timetabling (the course was not scheduled to run during the period of the LAMS trial: 6 mentions), technical problems with the institution's network coupled with resistance from subject teachers (1), and usability issues in relation to learners with special educational needs (SEN) (1). In the end, only 10 out of the original participants actually reached the stage of running a sequence with learners, including one who had to abandon the attempt because of technical problems.

3.5.2   Curriculum and intended learning outcomes

Participants designed, or planned to design, LAMS sequences in a wide variety of subject areas, including motor vehicle maintenance (FE), adult numeracy for SEN students (FE), marketing (FE), history (ACL, FE), biochemistry (HE) and e-learning (ACL, HE). The majority of sequences were intended to cover part of a course only (e.g. the modules "British Foreign Policy 1815-1865" and "Virtual Learning Environments"); in only two cases did they correspond to an entire course, one of them being a one-day workshop and the other being the "PETAL" sequence described in section 3.3.1.

Fourteen sequences were designed for courses leading to formal qualifications, ranging from GCSE to degree level. The fact that their authors intended to assess the learning outcomes in 10 of them indicates the level to which LAMS was taken seriously in the trial.

Seventeen sequences were planned to replace existing "chunks" of learning which previously had been taught through a variety of methods, including lectures and seminars as well as practical work carried out either individually or in pairs. The planned duration of sequences ranged from 30-40 minutes to a fortnight or more although, as some respondents commented later on in the questionnaire, it could be difficult to estimate the time required to complete individual activities.

3.5.3   Expectations of LAMS

We presented participants with nine possible reasons for using LAMS and asked them to tick all those applying to their chosen topic. From the responses, shown in Table 9, it is clear that motivational factors — engaging students in the learning process and encouraging the, to participate in discussion — were uppermost in participants' expectations. Support for collaborative learning also featured prominently, as did the ability to support students of differing abilities (even though one participant decided not to run her LAMS sequence with her SEN students on account of the text-heavy interface).

Table 9. Participants' reasons for using LAMS with their chosen topic

Reason	No. of participants
Motivate/engage students	20
Support participation by students in group discussions	13
Support collaborative learning	13
Support students of differing abilities	13
Enable the tutor to help more students in a lesson	5
For distance learning	6
Support part-time learners	4
Provide a common repository of resources	7
Track formative assessment	6
Other	5

Participants' free-text responses to questions asking them what benefits and risks they envisaged in using LAMS with their students clustered around the following themes:

- **Benefits:**
  - ❖ **To tutors:** Structuring of activities, improved support to learners (e.g. through the Monitor tool), support for a more dynamic approach to teaching.
  - ❖ **To learners:** Greater motivation/engagement, enhancement of reflective/metacognitive skills, ability to work at own pace, support for collaborative/peer learning, support for "anytime, anywhere" learning, structured/activity-based access to resources.
- **Risks:**
  - ❖ **To tutors:** Problems with the technology, tutors' own ICT skills, possible barriers to innovation in their teaching approach.
  - ❖ **To learners:** Problems with the technology, learners' ICT skills, levels of literacy (e.g. amongst speakers of English as a second language), inflexible structure of sequences.

Some of these benefits and risks are common to the benefits and concerns which participants mentioned in the pre-training questionnaires (Table 5), while others (notably relating to the structure of sequences) are specific to LAMS. It is interesting that, while some participants viewed LAMS as a means to broaden their teaching approach, others feared that it might stand in their way.

3.5.4 The learning environment

Turning to the questions of where, with whom, and with what other tools the LAMS sequences would be used, the overwhelming majority of sequences (20) were intended for use in class. However, many of them would be completed away from the classroom, as signified by the fact that asynchronous interactions were envisaged for 13 of them. Synchronous (Chat) and/or asynchronous (Forum) interactions among students were envisaged in 16 sequences, reflecting the prominence of collaborative learning as a perceived benefit of e-learning in Table 9.

All sequences were intended to be blended with off-line activities and resources which would include textbooks, handouts and, for the motor vehicle course, actual artefacts.

The majority of respondents recognised the need to cater for differences in learners' IT skills and general levels of ability, accommodate learners with physical disabilities and make provision for the technology to be available outside class. The needs of non-native English speakers were highlighted by the ACL respondents and by the HE tutor whose entire cohort was formed of overseas students.

3.5.5 Designing a LAMS sequence

Moving on to the 18 sequences which had been created in LAMS by respondents themselves, the key points to emerge from the questionnaire responses were:

- **Authorship:** 13 sequences were created solely by the respondent and 5 were the product of collaboration between the respondent and at least one other person.
- **Advance planning:** 9 sequences were created directly in LAMS without prior planning, while 9 sequences were mapped out in advance using either pencil-and-paper or computer programs such as Microsoft Word, CourseGenie and mind-mapping tools (no data was supplied for one of the sequences). However, LAMS was sometimes used as part of the planning process, as reported by this participant:

  "My colleague, the subject expert, using the paper-based activity as a guideline, created a Word document with the activities listed (after we had sat together and went through the types of offered tool in LAMS + accessed LAMS as a learner using a maths sequence). I then put these activities in LAMS, using the most appropriate tool that I felt suited to the task."

- **Re-use of existing LAMS sequences:** Only 2 sequences were created by adapting an existing sequence, in one case the "What is Greatness?" sequence referred to in section 3.3.3 and in the other a sequence previously created by the participant himself.

Those participants who had designed LAMS sequences to replace an existing piece of learning were asked if they had been able to incorporate **new activities** into their programme. Responses included:

◆ More structured exploration of resources (2).
◆ The ability to check learners' understanding of the tutor's introductory presentation (which had was delivered face to face) (1).
◆ Online communicative activities such as synchronous and/or asynchronous discussions (3), voting (2) and Q&A (1) (especially where these could be anonymous).
◆ Collaboration in randomly assigned pairs (1).
◆ Activities to promote reflection during the task (2).

It should be noted that online communicative activities were largely used to replace existing classroom discussions; that is, they represented a change of medium rather than a quantum shift towards more collaborative learning. Nevertheless, one participant felt that it was not so much a question of adding new activities, but of a wholesale shift in the teaching and learning experience:

> "I think it's more about the approach — the whole experience was changed from teacher-centred (lecture with or without the ability for students to ask questions given the time limit) to student-centred where students could work through the materials on their own or in small online groups at a time/duration of their choosing."

Only one respondent reported that she had had to drop an activity as a result of the move to LAMS: viz., hands-on experimentation with digital cameras and smart boards. However, another had had to keep an exercise involving summarising data in tables and graphs as an offline activity.

When asked what they felt **went well** during the process of designing and creating their LAMS sequences, participants' responses centred on a) the interface of LAMS' Author mode and the drag-and-drop method of creating activities which facilitated experimentation, and b) the activities available in LAMS, particularly Share Resources. Conversely, aspects of the process that proved less satisfactory included a) usability problems (particularly the lack of a preview tool until late in the project), b) program bugs, c) the interface in Learner mode and d) participants' inexperience with the functionality of the various activities.

When asked to assess on a 4-point scale how well LAMS **supported their own approach** to designing for learning, 4 participants gave the rating "very well" (i.e. the highest), 13 gave the rating "quite well" and one gave the rating "not very well" (no-one gave the lowest rating "not at all"; the remaining participants did not answer the question). In commenting on their response, participants praised the ability to visualise their design, while their principal criticisms focused on the linearity of sequences, poor facilities for storing sequences and poor support for learners with literacy problems. This last criticism, from a SEN teacher, was interesting as another teacher of SEN students did manage to run a successful sequence (see the next section).

3.5.6   Running a LAMS sequence with learners

As noted, only 14 LAMS sequences were actually run with learners, by a total of 13 participants. Generally the sessions seemed to have worked well for both tutors and learners, as the following summary of tutors' feedback indicates:

◆ **Aspects of the session which worked well:**

  ❖ **For tutors:** Use of communicative activities (Chat, Forum, Voting, Q&A), ability to monitor students' progress. One participant commented:

  > "LAMS proved to be easy to use for the purpose intended. The object-based interface was occasionally a little tedious but for the most part it did a good job, enabling me to construct sequences against tight deadlines. The ability to re-sequence objects encouraged reflection on the best order of presentation. The ability to monitor live 'use patterns' again provided insight into student behaviour. Inclusion of a vote on a favourite website guided design of subsequent sequences, an unintended but in retrospect obvious use of the system for quality

enhancement. The ability to demonstrate F2F with students how particular tasks could be carried out by following a sequence was useful subsequently during projects though there was possibly a danger of fostering dependency on the LAMS version of the task as opposed to independent non-LAMS use of the website in the LAMS sequence (and alternatives)."

❖ **For learners** (as reported by tutors): Ease of use, ability to work at their own pace, collaborative/group working (including the opportunities for reflection which it afforded), communicative activities. One tutor observed:

"Once the students got the hang of how to use it, they seemed to enjoy working through the activity. The activity was concerned with defining communities of practice and/or enquiry, and the students were able to reflect on their own participation in a community as they worked through the sequence as a group. […] When students acted as instructors, they reported ease of learning to use LAMS and 'have a go'."

◆ **Less satisfactory aspects of the session:**

❖ **For tutors:** Lack of knowledge of the functionality of individual activities, technical problems, linearity of sequences.

❖ **For learners** (as reported by tutors): Usability problems (especially the inability to return to a Chat or Forum in order to contribute further to the discussion), technical problems, inability to pace their own working, linearity of sequences, preference for face-to-face over online discussion.

In reflective mood, some tutors homed in on the actual design of their sequence as a contributory factor in the outcome of the LAMS session:

"The ease of authoring probably encouraged me towards an excessively didactic/ instructivist style that isn't really consistent with the aims of LAMS or good practice generally. Students also find the topic challenging and there probably wasn't sufficient scaffolding in terms of the background theory driving the websites we used and the rationale behind the LAMS sequence itself. […] I made limited use of the group facilities in LAMS and for the most part these seemed to work well. The notable exception was a mixed object that required students to chat and a scribe to report. Scribes were insufficiently briefed on their role and many took it either too lightly/quickly or too seriously/slowly."

When asked to assess on a four-point scale how effective the sequence had been overall in achieving the planned **learning outcomes**, 4 respondents gave the rating "very effective" (i.e. the highest), 8 gave the rating "quite effective" and 2 gave the rating "not very effective" (these were the practitioners interviewed in sections 3.3.1 and 3.3.4). No-one gave the lowest rating; i.e. "not at all". In an additional comment, the participant who had run two sequences felt that in the first sequence, which was based on an existing course, the learning objectives had not been achieved to the same extent as in previous years, but he attributed this to his inexperience with LAMS rather than to LAMS itself. The second sequence was completely new and students' performance in the assessed piece of work generally accorded with expectations. In response to a later question another participant thought using LAMS had helped her students to become more actively involved in the discussion and that 5 out of the 12 students had submitted work "of a reasonable quality, possibly of higher quality than in the past".

In response to another question asking them to rate on a four-point scale how effective they thought LAMS had been in enhancing their students' **experience of learning**, 5 practitioners gave the response "very effective", 7 gave the response "quite effective" and 2 gave the response "not very effective". Participants were also asked to report any observations that they had made in relation to eight specific aspects of that learning experience. The following is a summary of their feedback:

◆ **Students' motivation to learn:** 9 favourable observations were reported, two of which also commented on LAMS' "novelty value". One participant noted a positive correlation between interactivity and motivation, while another had observed no change in the motivation of "good" students and attempts by the "less dedicated" ones to sabotage the

sequence (fortunately, these were unsuccessful). Only one participant reported a lack of enthusiasm in her students.

◆ **Students' willingness to participate in the learning activities:** 11 favourable observations were reported, including the positive effect of peer pressure. However, one participant reported some initial shyness in getting involved in discussions, and another noted: "One or two may have felt threatened by new mode of delivery. One student asked if it would be possible to be anonymous in the online discussion. Another student may have been anxious about shortcomings in spelling skills."

◆ **The tutor's ability to make ad hoc variations to the lesson in response to specific circumstances:** Our request to comment on this aspect of the lesson was prompted by the fact that it is less easy to adapt the lesson "on the fly" in LAMS than in a traditional teacher-facilitated session. Some tutors appreciated the Monitor tool, which enabled them to pinpoint, and hence help, individual students who were falling behind. Difficulties encountered included the inability to define the size and composition of groups.

◆ **Students' control over their learning experience:** Reports varied. Generally, the more experienced students became, the more they appreciated being able to work at their own pace. However, some were frustrated by the inflexibility of a LAMS sequence.

◆ **The quantity and quality of tutor-student interactions:** At present, online tutor-student interactions are not supported in LAMS, but two participants noted an improvement in the quantity and/or quality of those face-to-face interactions.

◆ **The quantity and quality of peer interactions in collaborative activities:** Reports varied from "much improved" and "generally thoughtful and discursive, exploring both tasks and use of LAMS" through "really mixed. In some groups the collaboration was extensive and deep — in others superficial" to "low level (as much a product of the short time scale as of limitation of LAMS)". One participant reported that some inappropriate comments had been made at first, but these had stopped once the student responsible realised he/she could be identified. Another said that she might consider formally assessing students' contributions.

◆ **LAMS' effectiveness in supporting students working asynchronously and/or remotely:** Asynchronous tasks and discussions seemed to work well; for example, a collaborative task to design a LAMS sequence and the serendipitous asynchronous use of chat reported in section 3.3.2.

◆ **Any ways in which the tutor and/or students used LAMS that hadn't been planned beforehand:** Two tutors had been pleasantly surprised by the opportunities for supporting students afforded by the Monitor tool.

◆ **Other observations:** Observations under this heading included:

  ❖ Successful use of LAMS in conjunction with assistive software: Read and Write 7[13]

  ❖ A correlation between self-pacing and performance in assessed tasks: viz., in a sequence intended to be followed over an extended period "Use of the monitor showed that there was a (not unexpected) division between those who finished in good time and those who delayed to the day before".

Only two participants reported the results of surveys which they had conducted with their learners. One of these was the practitioner interviewed in section 3.3.4, whose students had had a largely unfavourable experience. The other had used LAMS' Survey activity to gather feedback from a class of 9 students, of whom 8 enjoyed the lesson, 7 felt that they had learned well, 6 found it easy to follow, 7 felt that they had contributed more than in an ordinary lesson, but only 5 felt that they had learned more than in an ordinary lesson.

The teacher of the SEN class which had used LAMS in conjunction with Read and Write 7 reported a generally favourable verdict from her students: "Students liked using it. They would like to use it again but they did want the questions to be clearer and wanted to have feedback on what they had done and their relative success."

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[13] Texthelp Systems Ltd: www.texthelp.com

3.5.7 Practitioners' review of their overall experience with LAMS

In all, 16 participants responded to either some or all of the "review" questions.

The first question asked participants to look back to the **benefits and risks** which they had envisaged when they embarked upon their LAMS experience (see section 3.5.3) and to assess to what extent these had been realised. Responses suggested that more benefits than risks had been realised, including an improvement in the learning experience. Risks that had been realised included, unsurprisingly, technical and usability problems.

Four questions paid attention to the effect of LAMS on practitioners themselves: their practice in designing for learning, their teaching approach, their IT skills and their overall workload.

In relation to LAMS' impact on their practice in **designing for learning**, 8 participants felt that designing a LAMS sequence had made them reflect on their own practice in terms of learners' needs and/or different types of learning activities; for example:

> "…made me think more about how I ask questions and how much students appreciate feedback."

> "It has extended the range of activities I would consider including in a learning experience. This includes both the type of activity (e.g. polling[14]) and the mode (e.g. potential for asynchronous activities)."

Two others felt that they now had an additional teaching resource, which for one could be "very useful for certain topics such as dry, theoretical ones where discussion and active learning is effective in promoting learning". One other participant thought LAMS had potential as a tool for collaborative design.

Asked what impact LAMS had had on their **approach to teaching**, one participant felt that it had made her "more inventive" and two commented on its support for a move away from "didactic" or "instructivist" approaches towards more "activity-centred" learning (e.g. "I think it has made me want to be less instructivist").

Although some participants had expressed concerns about their level of **IT skills** in advance of using LAMS, in practice their fears appeared largely unrealised. Responding to a three-point Likert scale, 14 felt that their existing expertise had been "adequate" for using LAMS, while 2 had had to learn a "few new" skills. No-one had needed to acquire "a lot" of new skills.

In response to the question asking them to rate on a five-point scale the impact that they would expect LAMS to have on their **workload** if their institution were to adopt it for general use, 3 envisaged some reduction, 3 envisaged no difference, 6 envisaged some increase and 4 envisaged a substantial increase (no-one envisaged a substantial reduction). In supplementary comments, six felt that the increased workload would be concentrated in the initial stages: "Systems like this have to be integrated within the institutional fabric before they can begin to make real time savings", while another appeared to feel that the increase would be a permanent one: "The design of an activity sequence requires a lot of careful thought and planning. There may be some areas where activities can be reused e.g. tutorial topics but on the whole each year a fresh approach to activities is necessary due to changes in courses, groups, assignments etc."

One dimension of "effective practice" is the ability of practitioners to **share** their learning designs with their peers. Of the 15 practitioners who responded to the question asking them how important they considered this feature of LAMS on a four-point scale, 7 considered to be "very important". 5 "quite important" and 3 "not very important" (none considered it to be of no importance at all). From their supplementary comments to this question, one practical advantage of re-use is the time it saves when creating new sequences although "the pedagogy is crucial": i.e. the re-used sequence needs to match its adopter's approach. One practitioner felt that one could learn a great deal from looking at other people's sequences even if one did not actually re-use them, while another wanted the option to import and export extracts from a sequence rather than the whole thing. The development of a "sharing culture" was mentioned by two participants, although the prospects for this in HE seem limited at present:

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[14] Former name of the Voting activity.

"We are still at the stage where many practitioners are reluctant to share resources, or to use others. I think the LAMS environment and sequences can make a contribution to re-use, […] but the biggest change required is in the mindset of those delivering learning."

Replying to the $64,000 question asking them to rate how likely they would be to **use LAMS again** (assuming that their institution were to adopt LAMS), 12 participants said that they "almost certainly" would, 2 were "quite likely" to use it again and 1 was "not very likely". None gave the rating "not at all likely".

We also asked participants what **advice** they would give to colleagues planning to use LAMS. Responses focused on the following areas:

◆ **Planning:**
  ❖ "Allow plenty of time to plan and engage with this activity — it requires some rethinking for tutors of their ways of working."
  ❖ "Look at existing sequences to gain ideas"
  ❖ "Before writing a seq[uence], try one out as a learner to see their perspective; only then start authoring."

◆ **Designing:**
  ❖ "Check the working methods of tools individually before embedding them in your design."
  ❖ "Assemble your resources before building your activity sequence."
  ❖ "Be simple in your choice of tools."
  ❖ "Keep it short and simple to start with."
  ❖ "Build in optional activities to personalise learning."
  ❖ "Develop assessment as incentives for its use."
  ❖ "Work in a team (or get feedback from your colleagues) — the more heads you put together, the more ideas you will have."

◆ **Testing:**
  ❖ "Try to do a cut-down dry run with a few users before course delivery."
  ❖ "Test LAMS interface and your design with the lowest skill level users (or equivalent) of your cohort before course delivery."
  ❖ "If it's the first use of a new installation the system MUST be tested for your maximum numbers (scalability)."

◆ **Introducing to learners:**
  ❖ "Give good instructions, and start with a 'fun' activity to break the ice."

Although LAMS is *not* a **VLE**, there is some kinship between the two types of tool and so we asked participants for their thoughts on the relationship. Perceived advantages of LAMS included:

◆ Activity-centred approach, including integration of resources with discussion activities (2 mentions)
◆ Greater control over the learning activities (albeit in return for greater effort) (1 mention)
◆ The ability of the tutor to monitor learners' progress away from the classroom (2 mentions)
◆ Visual representation of the activity sequence (1 mention)

One person summarised LAMS' advantages thus: "Overall, the design of LAMS makes it easier to build, run, and monitor on-line learning sessions than in many VLEs".

Perceived advantages of VLEs over LAMS included:

◆ Administrative facilities (registration, assessment etc.) (3 mentions)
◆ Less rigid structure, making it easier to support differentiation (2 mentions)

At least two participants referred to the need for integration between the two tools (i.e. to launch LAMS sequences from a VLE). Finally, adopting a novel perspective on the relationship,

another participant was using the principles of learning design embodied in LAMS to inform his design of learning sequences in his institution's VLE.

3.5.8 Reasons for non-completion of the design questionnaire

Since a substantial proportion of those who had completed pre-training questionnaires did not submit design questionnaires, we felt that it was important to ascertain why they had been unable to participate in the LAMS trial as fully as they had initially hoped. We were less concerned about representatives from agencies — some of whom had already indicated that they were unable to identify suitable opportunities for using LAMS within their field — than about practitioners from universities and colleges. We knew from email communications relatively early in the project that two practitioners had had to withdraw, and in mid-April we wrote to the remaining 13 institutions from which we had not received design questionnaires, in order to ascertain what barriers they had encountered. Table 10 summarises our findings.

Table 10. Summary of reasons for non-completion of the LAMS design questionnaire. Note that some respondents cited more than one reason.

Reason	No. of responses
Practitioner was too busy to use LAMS	3
Too many technical problems were encountered running LAMS in the institution	1
No suitable topics were scheduled during the period of the trial	0
There was a lack of interest among the teaching staff who could potentially have been involved	2
LAMS proved not to be relevant to the institution or to the practitioner's situation	1
Practitioner was ill	2
Practitioner was not in a teaching role	1
Practitioner changed their job or left the institution's employment during the trial	2
No reply received	5

At least two institutions in the FE sector had been affected by OFSTED inspections. One HE participant who had been "too busy" said that she planned to run her LAMS sequence within the next few weeks.

Five respondents remained very positive about LAMS. Comments to this effect included:

> "I experimented with LAMS and thought that it is very useful and will be fantastic when it can be integrated with Moodle, BlackBoard and other key VLEs."

> "I was genuinely very interested in […] piloting it. […] Now that it is available in Open Source I would like to encourage our IT services to consider [it]. I would like to return to review and make use of LAMS as soon as I can."

However, not all would be able to host LAMS themselves and so, like the ACL tutor interviewed in section 3.3.4, some would welcome the continued provision of LAMS on a communal server:

> "I know that I would have difficulty getting my institution to host it, so it would be useful to have JISC continue if that were possible."

3.6 Analysis of sequences

As of 25th April 2005, there were 14 sequences in the public area of the LAMS server which had been authored by, or were thought to have been authored by, participants in the LAMS trial, and which appeared to be in a relatively complete state (i.e. they had a coherent flow of activities from start to end).[15] Eight were known to have been used with learners, two had yet to be run, while the status of the remaining four was unclear. The analysis that follows is based on the surface features of the activities only.

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[15] The server was also being used to store LAMS sequences created in other studies.

As Figure 7 on the next page shows, the sequences ranged in length from 4 to 20 activities. The average length was 8.9 activities (or 7.1 if one excludes the shortest and longest sequences) and the median length was 7. As Table 11 below shows, the most frequently occurring activities were the sharing of resources (a combined total of 45 for Share Resources and Resources + Forum) and Noticeboard (28), which was also the most common opening activity.

Table 11. Analysis of the activities included in sequences created by LAMS participants

| Activity	No. of times used	% of all activities	Activity	No. of times used	% of all activities
Chat	3	2.4%	Q & A	11	8.9%
Chat & Scribe	0	0.0%	Q & A + Notebook	2	1.6%
Chat & Scribe + Notebook	1	0.8%	Resources + Forum	6	4.8%
Forum	7	5.6%	Share Resources	39	31.5%
Grouping	5	4.0%	Submit Files	7	5.6%
Multiple Choice	2	1.6%	Survey	1	0.8%
Notebook	2	1.6%	Voting	7	5.6%
Noticeboard	28	22.6%	Voting + Notebook	3	2.4%

Participants thus appear to have used LAMS primarily as a tool for making Web-based resources and other documents available to their students in a structured manner (even though this appeared only as a minority reason for using LAMS in Table 9). However, this was largely a one-way process, as an investigation of these activities showed that learners were invited to contribute their own resources in only 7 out of the 45 cases.

Participants clearly recognised LAMS' value as a communicative tool, as Chat, Forum, Voting and Q&A activities were included in 13 of the 14 sequences and accounted for over a quarter of the total number of activities. Although asynchronous discussions predominated over synchronous ones (13 Forum discussions versus 4 Chats), other forms of synchronous activity — Voting (10) and Q&A (13) — featured prominently in participants' designs. As can be seen from Figure 7, a synchronous communicative activity followed the introductory Noticeboard as an "ice-breaker" in 9 out of 14 sequences. We should also note that, from our interviews with participants, a number of Forum and Resources+Forum activities were actually used in synchronous, rather than asynchronous, contexts.

However, the overall figures for resource-sharing and communicative activities mask considerable variations in the patterns of usage. For example, the analysis of individual sequences showed that communicative activities outnumbered resource-sharing ones in six sequences (A, C, D, E, G and H), while the situation was reversed in five sequences (F, J, K, L, and M). Sequences F and L only had one communicative activity and sequence J had none at all. Although sequences K, L and M each had a number of Share Resources activities, in none of them were learners invited to search for Websites themselves and share their discoveries with the rest of the class. All in all, this analysis suggests that, although support for collaborative learning is considered one LAMS' greatest strengths (see Table 9), the program appears amenable to a range of teaching approaches, including those which are more teacher-directed and/or focus on activities carried out by learners working individually.

Activities that explicitly encouraged reflection — i.e. Q&A + Notebook and Voting + Notebook — appeared to be in the minority (6.5% of the total activities), but this does not take into account a) the possibility that instructions within other activities might have advised learners to make notes in their private notebooks, or b) the opportunities for spontaneous reflection afforded by discussions in Chat and Forum (see, for example, the account of a student's "asynchronous" chat in section 3.3.2).

The Survey activity was added to the LAMS toolkit relatively late in the trial; hence the paucity of its use (one person had inventively used Q&A to serve the same purpose). The lack of Chat & Scribe activities was attributable to conceptual difficulties over its nature and purpose, as reported by at least one participant on EPED-LAMS.

Figure 7. Structure of LAMS sequences on the public server

Key to symbols:
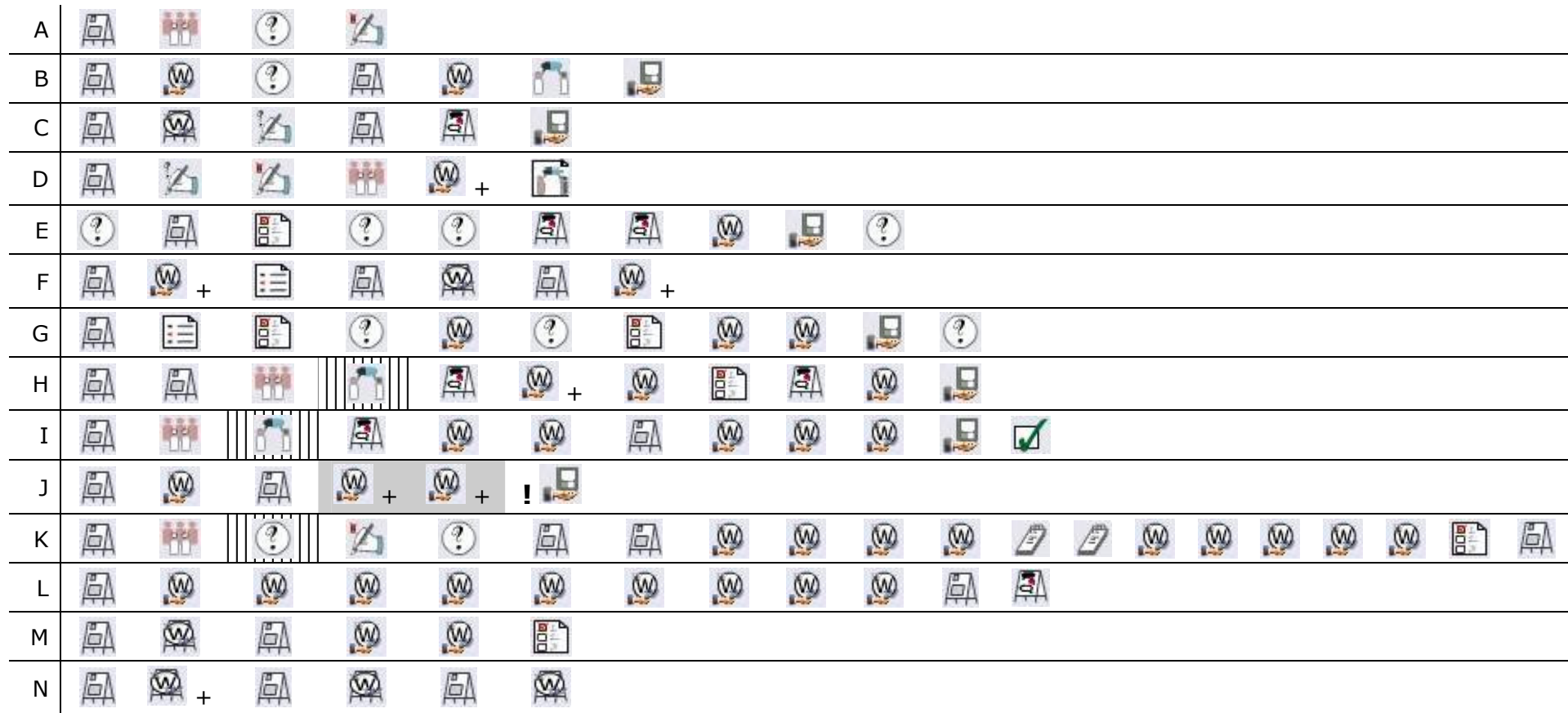
Symbol	Meaning	Symbol	Meaning	Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	Chat		Grouping		Q & A		Submit Files		Grouped activity
	Chat & Scribe		Multiple Choice		Q & A + Notebook		Survey	+	Learners allowed to add resources
	Chat & Scribe + Notebook		Notebook		Resources + Forum		Voting	!	Author inserted a Stop before this activity
	Forum		Noticeboard		Share Resources		Voting + Notebook		Optional activity

Not shown in Table 11 but also worthy of note are: the lack of use of the Stop feature (to prevent learners progressing to the next activity) and the ability to designate optional activities, which can relieve the linearity of LAMS sequences. These two features each appeared once only.

Finally, although learners were split into groups in five sequences, only three activities were actually defined as group activities, which means two of the groupings fulfilled no practical function. The widespread failure to use grouping may have been due to its random nature; in the versions of LAMS used during the trial authors could specify how many groups they wanted, but had no control over either their size or their composition.

4. Discussion

The main body of this discussion is devoted to considering the extent to which the results of the evaluation have answered the research question presented in section 2.1. However, we also a) review data from the pre-training questionnaires which can contribute to our understanding of the concerns of practitioners involved in designing and disseminating of e-learning, b) reflect on the issues arising from evaluating a program which itself is still undergoing development, and c) consider the question of retention of participants.

4.1 Effectiveness of LAMS

For the purposes of evaluation, the aims and objectives of the trial crystallised around the question whether LAMS can be said to support effective practice in designing for learning, where "effective practice" is defined according to the criteria of i) LAMS' acceptability to teachers, ii) its impact both on learning outcomes and on the learning experience itself, and iii) the possibilities that it affords for reflection on, and the sharing of, learning designs.

4.1.1 Acceptability to practitioners

Both the superficial analysis of sequences and participants' responses to the design questionnaire suggest that LAMS is capable of supporting a range of pedagogical approaches, in that designers can choose from LAMS' toolkit those activities that match their preferred style. However, the presence of such a wide variety of activities may bring to teachers' attention activities which they might not have considered before and thus stimulate them to broaden their approach.

One possible shortcoming in LAMS which was pointed out by a group of SEN students who clearly need a guiding hand more than other learners, but which might also be relevant to the most social-constructivist of teachers, is the lack of provision for teachers to give direct feedback to students within the program. Given that the teacher can have access to all the learners' work in LAMS (apart from their personal notebooks), a natural next step would be to enable him/her to intervene in Chat and Forum discussions (even where these are grouped) and to engage in one-to-one conversations with individual learners, both synchronous and asynchronous. Otherwise, there is no way within LAMS for teachers to guide learners towards the sorts of understanding that are the goal of the sequence or to give the reinforcing feedback that reassures learners that they are on a productive track.

A second sub-criterion of "acceptability to practitioners" is whether LAMS enables the design of appropriate learning tasks: i.e. activities that are appropriate to the objectives defined for the sequence and to learners' differing needs and preferences. Here, it must be acknowledged that the text-oriented learner interface is a distinct disadvantage, even though assistive software did work successfully in one instance. The ability to format text and to insert graphics into LAMS activities is essential, and links to Web-based interactive exercises must not compromise the functionality of those exercises. The potential of LAMS to support appropriate asynchronous learning tasks, as well as synchronous tasks carried out by learners who are geographically dispersed, remains to be explored in more depth.

The final sub-criterion relates to the demands which LAMS makes on practitioners' time, interest and skills. The participants in the LAMS trial were a highly motivated group of people,

expert in the use of IT[16]. Even so, the majority envisaged that LAMS would bring about an increased workload in the early stages and/or on an ongoing basis (notably in the case of those performing a support role). Undoubtedly the absence of the Preview tool accounted for a sizeable proportion of the time needed to create and test a LAMS sequence, but we have not yet ascertained whether its addition to LAMS has alleviated the situation. What is clear, though, is that the most profitable (or least costly) deployment of LAMS in terms of time would be in the creation of new courses rather than the adaptation of existing ones.

4.1.2   Impact on learning outcomes and the learning experience in general

The evidence from both questionnaires suggests that raising the level of learning outcomes was not a prime consideration for practitioners in the use either of e-learning in general or of LAMS in particular. That said, LAMS appears neither to have compromised learning outcomes in comparison with the existing learning environment (other than as a result of practitioners' inexperience in designing effective sequences) nor to have resulted in dramatic improvements in achievement. From the perspective of practitioners, the real benefits of e-learning for learners appear to lie elsewhere, notably in increasing their motivation to learn and in encouraging more reticent students to participate in the learning activities. In both of these respects, LAMS appears to have been a success — although how long it would remain so once the novelty value had worn off and LAMS had become embedded in students' learning is a matter of conjecture. It should also be noted that teachers were not universally satisfied with the quality of students' collaborative work as manifested in the chat-rooms and fora.

The small amount of data gathered directly from learners, together with reports from their teachers, suggests a mixed response to the LAMS learning experience, some students enjoying the independence and freedom to work at their own pace while others either chafed over the linearity of the sequences or were left wanting more direct feedback on their progress. These differences may be a function of their differing learning styles and preferences as much as of the structure and content of the sequences through which they were working.

4.1.3   LAMS as a tool for reflecting on, and sharing, one's practice

Both the design questionnaire and workshop discussions yielded evidence that several participants engaged in some form of reflective activity either during the process of designing a sequence ("was I wanting them to chat, or complete a poll?") and afterwards ("I think it has made me want to be less instructivist"). However, it is unclear whether this reflection is a function of LAMS itself or of its novelty. Otherwise put, introducing a new tool to a familiar task brings processes that have been automated back to the practitioner's awareness as he/she is forced to map them to the equivalent processes within that tool and the new possibilities afforded by it. However, whether that level of conscious reflection would be maintained once LAMS had become embedded in their practice is another matter.

In terms of sharing practice, the EPED-LAMS mailing list was used to air questions, achievements and problems from an early stage. The frequency and overall volume of contributions and the number of participants were not large enough for one to state with confidence that a community of practice had emerged, but the signs were positive and it will be instructive to follow the development of the LAMS Community under the aegis of LAMS International.

In terms of sharing learning designs, we have already noted that only a small number of practitioners uploaded their LAMS sequences to the public area of the server, for reasons that may have included belief that the sequence would be not be of relevance to others and fear that the quality of the sequence was not representative of its author's teaching approach. A possible shortcoming of the evaluation was the lack of attention paid to questions of sharing and re-use, but two points did emerge. First, practitioners appeared to ascribe more importance to the matter of sharing and re-use in principle than in practice, as will be discussed further in section 4.2. Second, the simplistic folder management system within LAMS, together with the difficulty of renaming and deleting sequences and the limited provisions for metadata (descriptive text about each sequence) restricts the ease with which

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[16] With the possible exception of those practitioners recruited through the WEA who did not actually use LAMS, and about whose IT skills it is therefore difficult to make conjectures.

practitioners could identify sequences written by others that might be of interest or use to them.

4.1.4   LAMS as mediator of new types of teaching and learning experience

A key property of any new tool which is introduced to mediate a particular activity is its potential to modify the very structure of that activity (Säljö 1996). In order to answer the question whether LAMS can modify the structure of the activity of teaching and learning, and thereby enable new types of teaching and learning experience, we need to ask what is it that teachers and learners in the trial found that they could do with LAMS that was either difficult or impossible with a) the tools to which they had used previously and b) other e-learning tools (including those which participants may not yet have used) (cf. Masterman 2004).

We have already noted (in section 3.5.6) how at least one teacher found that using LAMS had prompted him to shift away from a didactic to a more social-constructivist approach, but this is not something that would have been either "difficult" or "impossible" before, neither had he uncovered a whole new approach to teaching in general. In this respect, the use of LAMS had simply awakened him to an alternative, *existing*, approach which he then recognised might be more productive. Thus, rather than look for evidence of whole new pedagogies within the data from this trial, we should look for signs of new dimensions to the individual activities, or sequences of activities, that comprise teachers' approaches. Three stand out in particular:

i)   The ability for teachers to bring together online research and discussion activities in an ordered manner. Although it is perfectly possible to carry out these activities in a VLE, the orchestration aspect is lacking in such an environment.

ii) The ability for teachers to analyse, at leisure, the exchanges in online discussions in order to provide feedback that otherwise would have to be based on memory or rough notes of oral exchanges and/or to reflect on and modify their teaching of the topic.

iii) The ability for teachers to monitor their students' progress even when the latter are working away from the classroom in their own time and thus to intervene with advice when trouble seems to be looming without having to wait for the student to realise they need help.

In terms of the learning experience, none of the activities in the LAMS toolkit is wholly new, but a number of them do add an extra dimension to familiar tasks, such as making it possible to continue a discussion beyond the end of the lesson or enabling learners to share the fruits of Web searches in a more cohesive manner. Other activities do afford new opportunities for learning *provided that learners are receptive to them*, although it has to be said that LAMS is not unique in this respect. These opportunities include:

i)   The ability to review contributions to an online discussion which may prompt the learner to reflect on his/her own conceptions and, potentially, to revise them.

ii) The possibility of participating anonymously in an online discussion, which can encourage less confident learners to contribute where otherwise they would remain "silent".

However, it must also be acknowledged that the mediating influence of LAMS is not always a benign one and teachers need to be alert to, for example, the quality of online exchanges.

4.1.5   Conditions for the successful deployment of LAMS

In concluding this discussion of LAMS' effectiveness in supporting learning, we draw attention to a number of contradictions within the data reported in the results; for example, between those participants who enjoyed using LAMS in their teaching and those who did not; those who felt LAMS could accommodate learners of differing abilities and those who felt it could not; and between those learners who appreciated the independence afforded by working through a LAMS sequence at their own pace and those who felt straitjacketed by it. Such contradictions are unsurprising; indeed, to quote Penuel and Wertsch, there is "an irreducible tension between the […] tool, as a resource to anyone in a particular sociocultural context, on the one hand, and the individualized use of that tool in carrying out a unique performance, on the other" (Penuel and Wertsch 1998, 26). Nevertheless, we can, with a fair degree of confidence, tease out from our data those conditions that appear most conducive to a productive and enjoyable experience with LAMS on the part of both teacher and learners:

i) If the initiator is a teacher in the subject for which the LAMS sequence is being created: some experience in the use of ICT to support learning, coupled with a willingness to experiment.

ii) If the initiator is an ICT teacher or co-ordinator: active support from the teachers of the subject.

iii) Practical, strategic and moral support from upper management as well as from the ICT department.

iv) In-depth understanding of what is likely to work well (or not) for the learners who are to study with the sequence (either a specific cohort or "typical" attributes of learners of the target age and ability level).

v) Willingness to invest time in developing and testing the sequence.

vi) Creativity in:

   a) Identifying opportunities available within LAMS for broadening the range of activities and/or opening up one's teaching approach;

   b) Devising ways to circumvent any apparent limitations of LAMS.

vii) From the learners' perspective, clear relevance of the activities in the LAMS sequence to their programme of learning.

viii) Readiness on the part of learners to participate in, and profit from, the enhanced opportunities for learning which LAMS affords (this may in part be a function of vii)).

ix) Adequate induction and training before learners set to work in LAMS for the first time.

Recommendations on specific aspects of designing a LAMS sequence are given in section 5.2.

4.2 E-learning in principle and practice: additional data from the pre-training questionnaire

The pre-training questionnaire was designed to elicit further details about the participants, their attitudes and roles, the technologies they were already familiar with, and their reasons for involvement in the trial. Although partly intended as base-line data for the subsequent use of LAMS, this information was also expected to be useful in understanding the process of e-learning adoption more generally.

The sample constituted a cross-section of UK post-16 practitioners with an active commitment to adopting e-learning, even when systems were new and untried. Although they cannot therefore be considered representative of practitioners in the FE, HE and ACL sectors at large, some of the data collected does concur with previous studies. For example, participants' concern over students' ICT skills reflects the concerns encapsulated in the CITSCAPES project[17] and the high priority given by many HE institutions to developing the ICT skills of new undergraduates. Moreover, some of the data from the FE practitioners parallels findings reported in Becta's report to the Learning and Skills Council on ICT and e-learning in that sector (Becta 2004), in particular the low range of technology types used regularly by practitioners, the use of intranets and the Internet rather than VLEs as information repositories, the relative lack of interest in using e-learning to provide individualised learning experience and practitioners' concerns over the availability of computers for students.

As already noted in section 3.1.4, a number of unexpected issues emerged from the analysis when we mapped the participants' perceptions of the benefits of e-learning to the issues which they considered when thinking about using a piece of e-learning with an actual group of learners. For example, although the ability to personalise learning (i.e. to tailor it to an individual learner's needs and preferences) was seen as a significant benefit in principle, in practice it was a minority consideration. The same was true of the capacity of e-learning to support asynchronous and distance learning, to facilitate the sharing and re-use of learning resources, to foster collaborative learning and to promote novel forms of communication.

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[17] www.citscapes.ac.uk

Without probing the participants further, one must largely speculate on the reasons for the disparity between e-learning in principle and e-learning in practice. For example, do people perceive the benefits but do not yet feel comfortable about changing their personal pedagogy? Or are they constrained by the prevailing culture and/or curriculum (for example, are individualised learning and personalised support incompatible with collaborative learning experiences?)? Or, are the appropriate tools not yet widely available in participants' institutions? Did participants simply repeat the "received wisdom" about the benefits of e-learning in the first instance, and why do these not match with the benefits they experience and expect in practice? Finally, if, as implied in participants' responses, many learners are not yet ready for the active learning opportunities afforded by e-learning, how can they be "scaffolded" towards autonomy, and can LAMS take a role in mediating this progression? Questions such as these point to possible promising avenues of investigation beyond the remit of the LAMS practitioner trial.

4.3 Technical and usability considerations

As envisaged at the start of the project, technical and usability issues loomed large throughout the period of the trial. These centred round:

◆ Technical problems accessing the MacQuarie server pending commissioning of the London server

◆ Program bugs and usability problems within the LAMS software

◆ Technical problems within institutions

The third issue lay beyond the control of the LAMS support and development teams (the platform requirements for running LAMS are as low as possible and were made clear to all involved), and there are clear lessons to be learned from the first, in that a) the server should be functional *before* participants need to start using the software, and b) a reasonable allowance should be made in the project schedule for potential delays of a technical nature. It is the second issue —running a trial with software which is still under development and thus prone to bugs and usability problems — that is the most problematic. A balance needs to be struck between a) capitalising on the growth of interest in learning design and helping to shape and promote that growth, and b) providing a robust product that is easy and enjoyable to use for both authors and learners. It is clear from the trial that LAMS fell somewhat short of the ideal in both respects and thus ran the risk of alienating users who were its potential champions. That this risk was not realised to any great extent is a product of three factors:

a) Most of the participants were experienced users of IT;

b) In the main, they were able to discern the potential of LAMS as both a learning design tool and a learning environment; and

c) The maintenance, through EPED-LAMS, of a continuous, constructive dialogue between the participants and the LAMS developers who were receptive and responsive to reports of problems and suggestions for enhancements.

The extent to which such a two-way dialogue will remain possible now that LAMS has been released as an open source product could be a matter of particular concern to those institutions who lack the resources to adapt the code for themselves or the funds to commission the required work.

4.4 Retention of participants

One particularly striking feature of the LAMS trial was the fall-off in participant involvement. Out of the 34 organisations represented by respondents to the pre-training questionnaire, only 16 were represented by respondents to the design questionnaire, and only a quarter of the original participants progressed all the way from initial training to the successful implementation of a sequence with learners. This low figure was bolstered by the realisation of the intention, stated by some respondents to the pre-training questionnaire, to "cascade" LAMS either from agencies to practitioners in the field (accounting for 7 new participants) or within an organisation (accounting for one new participant).

Nevertheless, we need to ask whether a net attrition rate of 50% is a matter of deep concern or whether it is to be expected in longitudinal field-based studies. Looking at the variety of

reasons given for non-completion of the trial, we would tend towards the second of these answers, but even so ways should be found to enable enthusiastic participants to complete the trial. For example, it might be possible to fund supply staff to take over some of a participant's normal duties, thereby enabling him or her to devote more time to the project. Or, it might simply be advisable to extend such projects over a longer period, especially in view of the fact that the nine months allowed for the LAMS trial included three months' worth of vacation.

5. Recommendations

On the basis of our findings from the evaluation and on the foregoing discussion, we now present a series of recommendations relating both to the future deployment of LAMS and to similar projects. We have categorised these according to the audience for which they are intended, as follows:

i)   Recommendations for JISC: suggested next steps in terms of taking forward the work with learning design applications, and LAMS; plus general remarks on improvements to the conduct of similar trials.

ii) Recommendations for practitioners: general guidelines for practitioners who wish to start using LAMS based on the experiences drawn from the trial.

iii) Recommendations for LAMS developers: a wish-list of improvements to LAMS itself requested by participants in the trial.

iv) Recommendations for developers of Learning Design tools: a list of features and functions that participants in the LAMS trial consider desirable for learning design tools in general.

These recommendations are also based in part on data which has been gathered during the course of other studies involving LAMS in which the LTG has been engaged, and which we believe is important to share with the present audience.

5.1 Recommendations to JISC and other funding councils

5.1.1   The London LAMS server
5.1.1.1 The future of the London server needs to be clarified. Many practitioners were reluctant to commit fully to the trial because they felt their work could be redundant after July. In any trial of this kind longevity of access to the server/software needs to be assured in order for practitioners to engage wholeheartedly and, hence, to maximise the outcomes of the trial. A minimum of two years is recommended.

5.1.2   Continued support for practitioners wishing to use LAMS
5.1.2.1 The EPED-LAMS mailing list should remain open until the end of 2005 in order to overlap with the nascent LAMS community being nurtured under the aegis of LAMS International. The facilitator/convenor of the LAMS community should i) include EPED-LAMS in email communications to the community and ii) encourage EPED-LAMS members to switch over to the community.

5.1.2.2 Even though LAMS is now open source it is quite clear that smaller institutions would be reluctant or unable to invest the resources needed to set up and run their own servers (especially in the FE and ACL sector). JISC should investigate (possibly with the RSCs for FE and ACL, and with the HEA/Subject Centres for HE) the possibility of running a regional/national server which hold packages like LAMS. A condition of use might be the requirement that sequences are deposited with bodies like JORUM and shared under a Creative Commons licence.

5.1.2.3 An easy to use "top tips" guide for authors wishing to create sequences in LAMS should be made available. A start on this is made in section 5.2.

5.1.3 Considerations for other investigations into the use of LAMS

5.1.3.1 In the course of the trial we have only been able to target properly the perspective of the practitioner. There is a clear need to look at three other aspects:

i) The user's perspective of LAMS and its usability (although ideally this should take place only after known usability issues in the LAMS interface have been addressed);

ii) The administrative functions of LAMS;

` iii) The technical requirements for running LAMS locally (i.e. on an institution's own server), and its robustness.

5.1.4 Considerations for similar investigations in the future

5.1.4.1 While recognising that a certain attrition among participants is inevitable in a longitudinal trial, steps must be made to minimise the rate of loss. Possible courses of action might include offering participants some form of remuneration, or funding supply staff to carry out participants' normal duties so that they can devote the necessary time and resources to the trial.

5.1.4.2 A reliable server *must* be functioning from the very start of the trial. Transferring from one server to another can cause delay and confusion.

5.2 Recommendations for practitioners

5.2.1 Authoring a sequence: general

5.2.1.1 Before creating any sequences at all, work through at least one sequence as a learner.

5.2.1.2 To begin with keep your sequences simple and straightforward. Start with 6 or 7 activities per sequence, to allow you to get a feel for running it in the class without over-complicating things.

5.2.1.3 Avoid more complex activities such as Chat + Scribe and Grouping until you and your students are more familiar with the software.

5.2.1.4 Some activities will only succeed in certain contexts. For example Chat relies on the existence of a group working synchronously.

5.2.1.5 Try to follow up an activity which students do by themselves with a chance for them to discuss or record their reactions. For example, you could follow Q&A with something collaborative like Chat or a Forum.

5.2.1.6 When creating an activity try give it a name which is meaningful within the context of the task, rather than leaving the default name in place; for example "Vote for the top Web site" rather than just "Voting".

5.2.1.7 Export all your sequences for safe-keeping.

5.2.2 Authoring a sequence: specific activities

5.2.2.1 A common starting point is a **Noticeboard** explaining to the learners what is expected of them, outlining the learning objectives and outcomes.

5.2.2.2 The **Chat** activity is an excellent ice-breaker and gets the students involved. It can, however, only be used when students are working synchronously. For Chat to work you need to have a good cohort of students in the chat room at the same time, but not too many. Observations suggest that you try to have a maximum of 4-6 students in a chat room, otherwise the postings come in too quick and scroll off the screen. If you use Chat early on (i.e. the second or third activity after the Noticeboard) then you could use Grouping to control the chat room sizes. However, if you employ Chat later on you run the risk of having students arriving at different times and entering the chat rooms by themselves (this problem is exacerbated if the Chat is a grouped activity). It is suggested, therefore, that if you wish to use Chat towards the end of a sequence either place a Stop before it so that you can move a large cohort in at the same time, or avoid grouping.

5.2.2.3 When linking to external Web sites in **Share Resources** or **Resources + Forum** avoid sites which use frames, or in which the navigation relies on the buttons inherent in the browser. When web sites appear in LAMS the standard Back button, for example, is hidden and you can only navigate by links within the page. Test the web sites again prior to running the sequence as occasionally URLs can change.

5.2.2.4 Take care when using the **Grouping** activity, as LAMS v1.0 only allows you to specify the number of groups that you want, *not* their size or composition. If you want specific groups of students to do particular sequences of activities, then you must create a separate sequence for each group.

5.2.2.5 Remember that the **Options** tool provides a way to vary learners' paths through a sequence.

5.2.2.6 Place a quick **Survey** at the end of each sequence to capture student feedback.

5.2.3 Running a sequence with learners

5.2.3.1 Pilot the sequence with other teaching staff or a small subset of learners (drawn from both ends of the ability range and/or a range of learning styles) before going live with a whole class.

5.2.3.2 Set aside some time to explain the interface to the learners. Not all learners find LAMS intuitive at first with and evidence from the trial suggests that the successful sequences included a short face-to-face introduction. For example, explain what the progress bar does (top left), how they can use the notepad, the need to look for the Finish button — or buttons, when the screen is split into two frames and the learner needs to "finish" both sub-activities (as in Resources + Forum).

5.2.3.3 Encourage the students to take time over the sequence and to avoid simply "clicking" through the activities. Anecdotally there was a correlation between student enjoyment of using LAMS and the time they took over an activity (i.e. they derived more from it if they took time over the sequence and engaged in the collaborative activities). Encourage them to return to discussion forums at later stages to review the input from other learners.

5.3 Recommendations for LAMS developers

5.3.1 Author mode: interface

5.3.1.1 The names of the activities themselves could be made more intuitive.

5.3.1.2 Many "features" of activities (e.g. the number of items for which learners can vote) are opaque to the user, either because they are currently hidden at the foot of a scrollable dialogue box or because their functionality is inadequately or misleadingly labelled. They therefore need to be made more visible and/or more intuitive.

5.3.1.3 It should be possible to display a summary of each activity by hovering the mouse pointer over the icon for that activity in the workspace.

5.3.2 Author mode: functionality

5.3.2.1 Allow teachers to change a sequence once it is under way in order to respond to situations that may arise.

5.3.2.2 Although it is possible to make activities optional, practitioners want the ability to branch activities and direct students down different paths in the same sequence (e.g. conditionally on the outcome of a previous activity).

5.3.2.3 It should be possible to set either a compulsory or an advisory time limit on an activity or on the sequence as a whole, and to alert the learners to the time remaining for completion of the activity/sequence.

5.3.2.4 It should be possible to change the order in which resources appear in the Share Resources activity, rather than having to delete them and create them again in the correct order.

5.3.2.5 It should be possible to export/import portions of a sequence as an alternative to the whole sequence.

5.3.3 Learner mode: interface

5.3.3.1 Generally, the Learner interface needs to be more usable, aesthetic, and customisable. It is not intuitive as it stands, and for many sectors (e.g. primary and secondary schools, SEN) it is too text-heavy. At the very least it should support text formatting and the inclusion of images.

5.3.3.2 The progress bar on the left of the Learner interface should be made more comprehensible. For example, the colour codes should be explained or replaced with icons (e.g. "completed", "you are here", "to be completed"), and it should be made clear how students can back-track to previous activities.

5.3.4 Learner mode: functionality

5.3.4.1 Learners should be able to go back to certain activities in order to make additional contributions (as well as to review the contributions of others); specifically, Chat (and its derivatives), Forum and Share Resources.

5.3.4.2 A "permanent" discussion area should be available to learners so that they can exchange ideas etc. throughout the life of the sequence.

5.3.4.3 When linking to external Web sites in Share Resources and Resources + Forum it should be possible to have multiple windows open at the same time and to allow learners to navigate using conventional browser buttons. We suggest that authors be able to specify that a particular link will launch the default Web browser on the learner's computer, and that each link will open a new window in the browser.

5.3.4.4 In Share Resources and Resources + Forum learners need to be able to view both their personal notebook and Web sites simultaneously, so that they can take notes more easily.

5.3.5 Monitor mode: functionality

5.3.5.1 Teachers need to be able to contribute to/intervene in Forum and Chat discussions.

5.3.5.2 Teachers need to be able to communicate with individual learners within the LAMS environment.

5.3.6 Administration

5.3.6.1 The process for creating user accounts and classes needs to be evaluated with practitioners before we can give detailed feedback on its usability. However, anecdotal evidence from those who have worked with it at Oxford University implies that the interface is far from intuitive and a lot of manual work is involved.

5.3.6.2 It should be possible to create open sequences that users can elect to do "on the fly", rather than registering all users and assigning classes beforehand.

5.4 Recommendations for developers of learning design tools

5.4.1 Interface and functionality for authors

5.4.1.1 Design an easy-to-use authoring interface that incorporates drag-and-drop techniques for adding activities to the sequence.

5.4.1.2 Incorporate graphical representations to enable authors to visualise their designs.

5.4.1.3 Provide a broad range of activities.

5.4.1.4 Provide sophisticated functionality within activities, but ensure that they remain intuitive to set up.

5.4.1.5 Enable authors to design their own activities and integrate them into the learning design tool.

5.4.1.6 Accommodate blended approaches to teaching (i.e. mixing online and F2F).

5.4.1.7 Provide an option to control the time allowed for an individual activity and/or the entire sequence.

5.4.1.8 Allow teachers to change a sequence once it is under way in order to respond to situations that may arise.

5.4.1.9 Enable authors to create branches in order to direct students down different paths in the same sequence.

5.4.1.10 Provide a range of options for grouping learners: e.g. maximum group size, maximum number of groups, specify composition of groups, allow random allocation of students to groups.

5.4.1.11 Allow the learning design tool to be easily integrated with other software, e.g. office productivity applications, mind-mapping and other diagramming tools.

5.4.1.12 Enable authors to preview their design.

5.4.1.13 To assist novice authors, provide "wizards" or templates within the tool or make available easy-to-use guides to best practice.

5.4.2 Interface and functionality for learners

5.4.2.1 Provide a usable and aesthetically pleasing interface for students that can be modified to accommodate different age groups and/or learning styles.

5.4.2.2 Provide an easy way for the learner to monitor and assess their own progress.

5.4.2.3 Allow the learner to leave a sequence and rejoin it later at the same point, even if they are in the middle of an activity.

5.4.2.4 Make a discussion area available for the duration of the entire sequence.

5.4.2.5 Enable learners to save their work (including Chat and Forum discussions) in their personal folders (i.e. outside the LAMS environment), in order to:

5.4.2.6 Support learners' development of their e-portfolios.

5.4.3 Monitoring

5.4.3.1 Make it easy for the teacher to monitor and assess individual learners' progress.

5.4.3.2 Allow the teacher to intervene in the sequence when it is running and to look at all learners' contributions at the end in order to reflect on the overall experience.

5.4.4 Administration

5.4.4.1 Enable teachers to assign learners to learning sequences dynamically (i.e. without having to set up classes in advance).

5.4.4.2 Where possible, make it possible to integrate the tool with existing authentication/ authorisation services and VLEs.

5.4.5 Storage and sharing of designs

5.4.5.1 Provide a hierarchical system for storing and managing learning designs.

5.4.5.2 Provide a way to describe a learning design in general terms without requiring excessive cataloguing on the part of the author.

5.4.5.3 Provide a "topic map" so that an author can see all their own sequences (or all the sequences within a particular course) and thus identify connections and relationships easily and quickly.

5.4.5.4 Provide a versioning tool for tracking modifications to designs.

5.4.5.5 Provide facilities for interrogating remote repositories and collections.

5.4.5.6 Make it possible to export/import portions of a learning design.

5.4.5.7 Make it possible to export learning designs to other learning design tools.

5.4.6 Technology

5.4.6.1 Design the tool to run across platforms and to be hardware-independent (e.g. it should be capable also of running on mobile devices.

5.4.6.2 Provide a local client version so that both authors and learners can work offline if required (this is especially important where individuals work at home and would otherwise incur substantial costs connecting to the Internet).

6. Conclusion

Overall, the aims laid out in the Introduction to this report have been realised in that we have successfully evaluated the use and suitability of LAMS in post-compulsory education (albeit in the later stages with fewer practitioners than initially envisaged) by collating quantitative and qualitative data from two questionnaires, four visits to practitioners, the Practitioner Workshop, the EPED-LAMS mailing list and a number of LAMS sequences. Given the small number of participants and their generally advanced level of IT skills it is unwise to attempt to make large-scale generalisations on the basis of this data. Nevertheless, we have a) constructed a comprehensive picture of the types of situations in which LAMS may support effective practice in terms of tutors' practice and learners' experience and b) obtained limited, but useful, insights into the opportunities which LAMS affords for practitioners both to reflect on their own practice and to share their learning designs with others. Thus, it is with confidence that we have been able to make recommendations for the future direction of both LAMS and related tools and for the process of designing for learning.

To sum up, we can position LAMS as a tool which practitioners can profitably add to the repertoire already at their disposal — promoting motivation and participation in some circumstances and with some groups of learners but, like all tools, not universally applicable. However, the current interface and functionality make it perhaps more effective as a system for authoring learning designs than as an environment for fostering the acquisition of new knowledge and skills. Nevertheless, as a piece of technology that enables resources and discussion to be brought together within a cohesive flow of activities, LAMS has the potential, if not to transform teaching and learning in radical ways, then at least to take that experience in exciting directions for both parties alike. However, whether this potential will be realised on a wider scale depends in large part on the commitment of higher authorities to support and promote the use of LAMS. This trial has, we believe, persuasively demonstrated that *teachers* are committed to making LAMS work for the benefit of themselves and their learners.

Appendix: Documentation on the Web

1. General documents relating to the LAMS trial

Available at www.jisc.ac.uk/index.cfm?name=elp_lams

◆ Invitation to tender

◆ Expression of interest form

◆ Pre-training questionnaire

◆ Design questionnaire

◆ LAMS user spreadsheet

◆ Instructions for setting up student accounts on LAMS

2. Documents relating to the LAMS Practitioner Workshop

Available at www.jisc.ac.uk/elp_lamsworkshop.html

◆ Workshop summary

◆ Presentations by the evaluation team:

   ❖ Introduction

   ❖ Progress report

- ❖ Analysis of the pre-training questionnaires
- ❖ LAMS in the future
- ◆ Presentations by practitioners:
  - ❖ LAMS sequence from CRIPSAT
  - ❖ Use of LAMS at Bromley College
  - ❖ Use of LAMS at the University of Greenwich
- ◆ Instructions for working groups
  - ❖ 1: Designing for learning
  - ❖ 2: Running a LAMS sequence and ideas for the future

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