

JISC/NSF Digital Libraries in the Classroom Tools Evaluation

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Executive Summary

The study looked at the four projects funded under the JISC/NSF 'Digital Libraries in the Classroom' scheme. Specifically it was asked to look at the e-learning tools developed or used in the projects, their availability, functionality, accessibility, applicability, and adherence to the emerging JISC IE guidelines.

The projects are only mid-way through their lifecycle and thus many of the tools are not complete or have not been fully rolled out. Moreover the original criteria for the scheme did not emphasise specifically the above concepts and the discussions surrounding interoperability standards were in their infancy. However, despite this many of the tools developed do conform (wholly or in part) to the requirements, or could be made to do so with some additional work.

The projects have developed a range of tools which could be very useful to other JISC projects and practitioners. If dissemination is co-ordinated, appropriate take-up of these could be high.

Specifically the report presents the following recommendations to JISC (there are additional comments for the respective tools later on):

Specific Recommendations for JISC

- 1) When entering into a partnership with a collaborating body elsewhere the criteria by which the projects will be evaluated should be synergised. For example, it could be agreed that all products produced under the initiative will be released as open source, or all projects will have to engage in some form of evaluation and reporting process, or all projects should adhere to emerging standards.
- 2) UK projects should be encouraged to deposit all the learning objects they have developed within JORUM.
- 3) It is important that information about these tools is disseminated. First, other JISC projects should be alerted to their availability to provide the potential for reuse (see 6.2.3). Second, the potential for these tools should be relayed to practitioners in a manner and language understandable by them. Possible suggestions that spring to mind are workshops or guides on 'Using audio or video in your teaching' (demonstrating ProjectPad, What's Going On?, and/or MediaMatrix); 'Creating a quick online collection' (ProjectBuilder, LauLima); 'Collaborative learning and reflection' (LauLima, Reflective Diary); 'Designing effective learning activities' (Toolkit for Learning Activity Designers), etc. These should use existing networks such as the HEA Subject Centres, BECTA, TASI, etc in the UK, with Educause, CNI and JCDL in the US and ECDL in Europe.
- 4) JISC may wish to consider a follow-up 'adopters' call for projects in which funding is awarded to institutions who specifically take up one of the tools used/developed in the 'Digital Libraries in the Classroom' scheme and embed them into their own teaching.

- 5) All of the projects should be encouraged to release their tools as open source products via Sourceforge. Money from the dissemination funds should be put towards (in part) preparing full technical documentation, and tidying up interfaces.
- 6) All of the projects should liaise with OSS-WATCH to discuss the most appropriate licence.
- 7) A single page under the JISC's web site should include brief summaries of the projects, brief descriptions of the tools (including technical specifications), links to more detailed user documentation and links to downloads on Sourceforge.
- 8) UK projects should liaise with CETIS and UKOLN to discuss what modifications could be made to their tools to make them more compatible with emerging standards.
- 9) Major work on making the tools conform to the emerging IE guidelines can not be assumed to come out of existing budgets for the projects. If additional work is identified that will bring the tools in line with the IE then additional funding may have to be found.

JISC and NSF response: when embarking on international collaborative work some compromises are necessary. With regard to standards, it was appropriate to point projects to the emerging standards at the time, but also to allow them to explore others that may be more relevant and useful. In the case of tools development, some of the tools were already in development and their different origins mean that they have different rules in terms of IP and commercial exploitation. The main aim is to evaluate their pedagogical use and all projects are taking this seriously.

This document has succeeded in highlighting the tools being developed and used in the programme and making more explicit their terms and conditions of use. This, along with an extensive programme of dissemination, will, we hope, encourage uptake of these tools.

Contents

1. Introduction: Background Information	5
1.1 Focus of Study	5
2. Summary of Tools Analysed	6
3. Methodology	9
3.1 Document Analysis	9
3.2 Questionnaire	9
3.3 Interviews	9
3.4 Timescale	10
4. Evaluation Results	12
4.1 General Remarks	12
4.2 DialogPlus	13
4.2.1 DialogPlus Toolkit for Learning Activity Designers	13
4.2.2 Reflective Diary	14
4.3 SpokenWord	15
4.3.1 MediaMatrix	15
4.3.2 ProjectBuilder	16
4.3.3 ProjectPad	17
4.4 DART	18
4.4.1 What's Going On?	18
4.4.2 Betsileo Rice Challenge	18
4.4.3 Investigator (Kolkata Explorer)	18
4.5 DIDET	19
4.5.1 LauLima	19
4.5.2 Infomedia	20
4.5.3 SMETE	21
5. Analysis	21
5.1 Availability	21
5.2 Interoperability (see Appendix 3)	22
5.3 Functionality, Applicability, Sustainability	22
6. Recommendations	23
6.1 Specific Recommendations for JISC	23
6.2 Availability of the tools	24
6.3 Interoperability	24
Appendices	25
Appendix 1: Survey	25
Appendix 2: Interview Schedule	26
Appendix 3: Interoperability Matrix	27

1. Introduction: Background Information

The Digital Libraries in the Classroom Programme forms part of the JISC Information Environment Activity. It is an international programme jointly funded by JISC and the National Science Foundation (NSF). The projects are running from February 2003 to February 2008.

1.1 Focus of Study

This study aims to examine e-learning tools being developed within the JISC/NSF funded Digital Libraries in the Classroom Programme. Four projects have been funded under this programme as follows:

- **The Spoken Word** – led by Glasgow Caledonian University, Northwestern University, and Michigan State University in partnership with the BBC exploring the use of digital audio within the humanities.
- **DialogPlus** – a partnership between the University of Southampton, University of Leeds, Pennsylvania State University, and the University of California, Santa Barbara working in the Geography discipline.
- **DIDET** – a partnership between the University of Strathclyde and Stanford University within the engineering discipline.
- **DART** – a partnership between the London School of Economics and Columbia University within the discipline of Anthropology.

In particular this study explores:

- **availability** of the tool
- **interoperability** with other environments, bench marked against the JISC IE standards and guidelines.
- **functionality** of the tool, including to what extent accessibility has been considered by project teams.
- **applicability** of the tool to different user environments and generic use
- **sustainability** and needs for further development

Whilst this study will look at any evaluation conducted by the project teams into how their tools have been used in a teaching and learning context, the focus of this evaluation is on the individual tools themselves, not on the effectiveness of the wider projects as a whole. An evaluation to measure the key impacts of the projects developed under the Digital Libraries in the Classroom Programme is being performed separately (see http://www.jisc.ac.uk/index.cfm?name=funding_diglib).

2. Summary of Tools Analysed

The table identifies the tools examined for each project, the institution within the project partnership which developed and supports that tool, the main contact, supporting URLs and notes related to accessing the tool.

Table 1. Summary table of tools

Name of Tool	Institution	Main Contacts	Technologies Used	Notes	Supporting URLs
DialogPlus					
Toolkit for Learning Activity Designers	University of Southampton	Karen Fill	ASP, MySQL Server, PHPbb, Java Applets		http://www.nettle.soton.ac.uk/toolkit/Default.aspx
Reflective Diary	University of Southampton	Chris Bond	PHP, MySQL	Only accessible within the University of Southampton	
Concept Vista	Penn State	Mark Gahegan	Java	Available for download, user must have Java Runtime environment 4 or above.	http://www.geovista.psu.edu/ConceptVISTA/index.jsp
Spoken Word					
MediaMatrix	Michigan State University	Dean Rehberger	PHP, MySQL, Javascript	Distribution and licence not yet established.	http://www.historicalvoices.org/~mmatrix
ProjectBuilder	Michigan State University	Dean Rehberger	PHP, MySQL,	Distribution and licence not yet established	
ProjectPad	Glasgow Caledonian University	David Donald	Java, Flash	Distribution and licence not yet established	
DART¹					
What's Going On?	London School of Economics	Steve Bond	Flash, XML		http://clt011.lse.ac.uk:8383/steve/wgo/index.html
Betsileo Rice Challenge	London School of Economics	Steve Bond	PHP, MySQL, HTML		http://clt011.lse.ac.uk:8383/steve/brc/external_intro.html
Investigator (Kolkata Explorer)	London School of Economics	Steve Bond	Flash, XML, MySQL		http://clt011.lse.ac.uk:8383/steve/invstigator/index.html
DIDET					
LauLima	Strathclyde University	Louise McGill Andrew Lynn	PHP, MySQL	Username and password required	http://onlinelearning.dmem.strath.ac.uk
Informedia	Stanford University	Ade Mabogunje	Oracle,	No web version as yet	http://www.informedia.cs.cmu.edu/
SMETE	Stanford	Ade Mabogunje			http://www.smete.org

¹ The DART Project also produced a number of classroom based tools. "The Ethnographic Imagination" is the title of an anthropology course run at Columbia University. "The Ba-Li Ethnographic Experiment" is a class-based role-playing game used at LSE. "Meet the ethnographer" is a class-based seminar, although it has been run using video-conferencing and telephone conferencing.

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3. Methodology

The evaluation took a summative approach, focusing on the effectiveness of the finished tools or tools under development with a view as to recommending whether they could be used in wider settings and for their implementation to the project teams and JISC. To perform this evaluation we needed to be clear about the type of learning and functionalities that the tools were designed to achieve, thus being aware of general aims and goals of the individual projects and the part that the tools played within them. To obtain the information needed to effectively assess the tools the evaluation process made use of a number of data collection methods:

3.1 Document Analysis

To identify the aims and objectives of the projects, and the part that the tools played within them, the original project proposals and quarterly reports were gathered from each of the four projects. In addition some projects supplied papers and presentations that they had published. Tools were identified from this documentation by the evaluation team which formed the basis of a questionnaire to be issued. Contacts were also identified to fill in the questionnaire or to be interviewed.

3.2 Questionnaire

A questionnaire (See Appendix 1) was hosted online using SurveyMonkey to gather initial information about each of the tools developed, adapted, and utilized within each project. The questionnaire was sent to the project managers and key developers at each UK and US institution. As the aim of the questionnaire was to identify tools and their main functionalities the questions were open-response. Respondents were given two weeks to submit their responses and a reminder was issued prior to the deadline.

An issue arose within a number of projects concerning who would take responsibility for filling out the questionnaire. In response we suggested that the institution that developed each individual tool should submit a questionnaire response. In some cases this meant that there would be a number of responses for each project.

After the responses from the questionnaire were received the tools and contact details were collated for each project. This information was then passed on to each project for verification.

3.3 Interviews

Implemented after the questionnaire, interviews were held to obtain elaboration on important points that had arisen as a result of the survey responses. The interviews were semi-structured with the sequence and wording of questions organised in advance by means of a schedule (See Appendix 2). Conducted face-to-face with the UK project teams and via telephone with US partners, the data collected was largely qualitative and in-depth, allowing the exploration of the development process, user evaluation, and situations of use. Where possible the evaluation team gained access to the tools before the interview for hands-on experience, additionally all tools were demonstrated during the

interview process and in many cases the team was able to see student work that had been completed through using the tools.

3.4 Timescale

The evaluation ran from May to July, 2005. A summary of the timetable is presented below.

Table 2. Timescale and work packages

Development and piloting	May16	May23	May30	Jun06	Jun13	Jun20	Jun27	Jul04	Jul11	Jul18	Jul25
1. Communication											
2. Project Processes Evaluation											
3. Questionnaire Development, dissemination & identification of tools.											
4. Evaluation of tools using matrix											
5. Design and conduct interviews with project leaders											
6. Produce final project report											

4. Evaluation Results

4.1 General Remarks

Before discussing the tools employed by the various projects it is worth making some general observations about the nature and timing of this analysis. First, the original call for projects and the selection of successful bids did not focus on interoperability and reuse of the tools. Instead it targeted the student experience and looked for ‘innovative’, ‘distributed’, ‘multi-media’, and ‘multi-source’ applications demonstrating the suitability of digital libraries in the classroom. Although mention was made of sustainability, the focus was on the learner’s experience.

Second, the timeline for the projects is five years and all the personnel interviewed are working to that. With the delays experienced at the beginning of the project due to the need to reconsider budgets, many projects did not start in earnest until 2003 and thus are only really half-way through the five years. The initial period after recruitment was spent developing the tools, and it is only now that they are being rolled-out in earnest. This, again, is entirely understandable.

Third, the nature of the scheme has increased the complexity of the project management. As well as localised management, teams need to liaise closely with the appropriate academics, JISC (in the case of the UK), and their partners abroad. The difficulties in achieving all this successfully should not be underestimated.

Taking all three factors into account the fact that all projects, to varying degrees, have produced a tool or tools that partly or wholly conform to interoperability standards, and are being used (or have the potential to be used) by other disciplines is a testament to their excellent work and project management. Where tools do not conform to either of these criteria, one should not read any form of criticism. This is entirely understandable bearing in mind the initial tender for the projects, the state of thinking re interoperability in 2002/3, and the fact that we are only mid-way through many of the projects. A table has been included as Appendix 3 to outline the implementation of any standards within the tools evaluated in this document.

We now present a series of detailed analyses of the tools encountered in each of the projects (summarised at the beginning of this report). Here we are looking at tools that display a ‘unique’ element, and were either developed or brought in to meet specific needs of the individual projects. However we should also note that many generic tools were used, and are still being used by the projects to facilitate communication with their partners, document storage, management and co-ordination, and so on. Outside of standard office applications these include: Skype², blogging software (SpokenWord); Microsoft NetMeeting³ and iVisit⁴ (DART); QuestionMark⁵, Reload⁶, Macromedia

² www.skype.com

³ www.microsoft.com/windows/netmeeting/

Coursebuilder⁷, MindManager⁸, Swiki, Respondus⁹ (DialogPlus).

It should also be noted that due to the timing of this evaluation study it has proved difficult at times to get replies from some of the project partners (notably in the US). This is partly due to the timing of the evaluation and holidays, but also due to the different foci of the funding bodies. Therefore undoubtedly some information for the US-developed tools is missing.

4.2 DialogPlus

This project has created a series of learning objects (known as ‘nuggets’) to facilitate the teaching of Geography. No central repository of these has been established so far and they all reside within the individual institution’s VLE (or similar).

4.2.1 DialogPlus Toolkit for Learning Activity Designers

This is a single tool but links to a version of ConceptVista (see below), and PHPbb. It is a guidance application for teachers, to help them to design their learning activities asking them to state learning outcomes, aims, tasks, and to make explicit links between the three. It supports frontline teachers as they create learning activities, attempting to promote good pedagogy and reuse. It works on a concept of nuggets; a nugget being a learning object; and the toolkit takes the teacher through a series of templates to help them catalogue the nugget and the pedagogy surrounding it using established ontologies. It should be noted, however, that the toolkit helps the teachers to design a learning activity but not to actually output it as a runtime lesson (as with LAMS for example). The toolkit also has a built-in adaptive help to explain the various terms used in the ontologies. The tool was designed with a generic use in mind, although in the project it has been mainly applied to the teaching of Geography.

The tool has been developed under SQLserver and ASP .Net (the latter allowed rapid development). It utilises home developed Web Services (all available) to allow searching and to expose the underlying database to external applications. The client uses a standard web browser. This has been tested under Windows, but there are notable difficulties for other platforms (e.g. Mac clients in particular). No plug-ins are required but the client must be able to run Java applets. The tool uses its own authentication/authorisation and no attempt has been made so far to link it into external Authentication/Authorisation systems (hereafter AA).

In terms of interoperability the main demonstration of this has been with ConceptVista. This has been modified to allow it to ingest the XML outputted from the toolkit. The

⁴ www.ivisit.com

⁵ www.questionmark.com

⁶ www.reload.ac.uk

⁷ www.macromedia.com/support/coursebuilder/

⁸ www.mindjet.com/uk/

⁹ www.respondus.com

toolkit itself exports designs to XML which are close to IMS LD level A. The team uses RELOAD then to allow for full mapping across to IMS LD but there have been some problems. Notably, the toolkit contains some extra metadata which IMS LD does not accommodate and visa versa. In addition there are difficulties with the conditional sequencing of the activities.

The project did originally envisage that output from the toolkit could go into a digital library; or output to a QAA form to allow teachers to more easily get approval for new courses. Neither of these have been achieved yet, but in the case of the latter the teachers have stated this is not a requirement.

Some evaluation of the toolkit took place at the design stage. This for example led to a systems analysis of the way teachers create learning activities, what motivated them, and appropriate terminology to use. After development further workshops have been held with practitioners to test the system. More evaluation effort has gone into the nuggets themselves.

Finally it is envisaged that the tool will be made available under an open source licence but this has not been thought-through as yet.

4.2.2 Reflective Diary

This is an online version of a reflective diary akin to a blog, developed and supported at Southampton. It is aimed at providing the students with a reflective diary that teachers can also access. In this sense it is akin to a log-book but with an easy-to-use interface. It allows for text entries and image uploads.

It is written in PHP/MySQL and tied into the local LDAP server. However no work has been performed (as yet) on testing its accessibility or outputting to any developed PDP standards.

4.2.3 ConceptVista

ConceptVista is an ontology creation and visualization tool that allows users to explore and manage any ontology that is encoded in OWL (<http://www.w3.org/2004/OWL/>). Developed by the GeoVista GiScience and Geovisualisation centre the tool was developed primarily to explore geographical concepts. However, the DialogPlus project has led to a great deal of further development focusing on the use concept mapping for educational purposes, particularly in the area of curriculum and activity design. The tool requires Java Run-Time Environment (JRE) version 1.4 or higher and is freely available from Sourceforge or the ConceptVista website.

Presently, ConceptVista visualizes an ontology in two different views, namely, a tree view which displays a hierarchy of concepts (or classes) and a self-organising GraphView developed by TouchGraph LLC. By default, the tree view occupies the top left corner of the ConceptVista window and the GraphView takes up two-thirds of the space on the right side. Search functionality has been built into ConceptVista to enable

users to search the web (Google, Amazon, The Digital Library Earth Science Education) for the selected class, instance or resources creating a powerful browsing environment.

As mentioned above ConceptVista has been integrated within the Toolkit for Learning Activity Designers to provide a generic concept map of a nugget, and to enable designers to create their own concept map of a nugget that is being developed. It is envisioned that the Toolkit will eventually incorporate OWL so that whilst building a pedagogy activity designers will also be able to automatically build a conceptual view. Tools that compare concept maps are also currently being developed within ConceptVista and it is envisioned that these will be available within the next release of the tool. This would prove particularly useful for designers comparing curriculae and within collaborative design projects.

Some user evaluation has been conducted with the tool in the form of student surveys and informal peer feedback sessions, largely to refine functionality and the user interface. Accessibility has been loosely considered; for example, adjustable font sizes and mouse accessibility.

4.3 SpokenWord

The Spoken Word Project aims to blend rich media resources of digital audio repositories integrated with online annotation tools into undergraduate courses in history, political science and cognate disciplines in the U.S. and Britain.

4.3.1 MediaMatrix

MediaMatrix allows users to quickly assemble a collection of multimedia files, reference key points in them, and present these back as a project. The user points the tool towards a specific web page and this is then searched for audio, image, and video files (with the ability to also extract text). Users also have the ability to turn on or off a citation layer which will step them through a series of questions to help them conduct an evaluation of the source and collect information to produce a formal citation. The files themselves are not downloaded, but are merely referenced thus avoiding copyright issues. Editing functionality allows users to segment sound and video, resize and crop images, save text, and add their own annotations to that media. The information is submitted to Media Matrix and it is stored on the user's personal portal page. This page keeps all their annotations as well as provides direct links to the portions of the streaming media that were segmented.

A simple presentation facility allows users to present a report containing the references. Collaboration is also supported as teachers can create a group for each of their classes and invite students to join that group, allowing both the teacher and students to preview the work of and collaborate with other members of the class. Members of a group have complete control over permissions for access allowing a folder to be shared with a group or kept private.

The tool was developed by Michigan State University (MSU) and will be supported by them. It is not certain as to how the product will be licensed in the future though. MSU have taken out a patent on the tool though the developers themselves seem to favour an open source approach.

The tool is written in PHP/MySQL but employs sophisticated javascript at the client end. It will consequently run on a server that can support PHP/MySQL. There were previously difficulties with the way that non Windows OSs handled the inbuilt javascript (e.g. Mac and LINUX). However, this issue has been remedied in the latest release of Real Player for Mac, making MediaMatrix fully compatible with OSX. MediaMatrix can handle all standard web graphics, any plain text, Windows Media but with time-based media it can only accommodate streamed formats at present (e.g. QT and Real and MP3 on selected players). It displays to the client using XHTML via CSS, but does not export final presentation or references in any standard. This is something the project is working on. Finally it uses an internal AA system but they are discussing expanding this by utilising some of the developments originating from the SAKAI project.

Extensive evaluation has been undertaken on the use of MediaMatrix at Michigan State University, Tufts University, and in various high school environments. The tool has been integrated within a number of courses including “Introduction to history”, “English composition”, and Education. Samples of both students and teachers were used to provide the evaluation data through a series of questionnaires and interviews. The evaluation thus far has been formative, providing both technical and conceptual feedback to aid further development of the tool. Evaluation into the learning outcomes derived from using MediaMatrix will take place in Spring 2006 which will look at the Digital Library and a teaching and learning environment for creating greater understanding of content sources.

4.3.2 ProjectBuilder

Originally called ‘Repos’ this tool facilitates the easy creation of repositories. Designed and supported by MSU, it allows a user to quickly establish the metadata scheme to be used, to then ingest material and catalogue appropriately, and to deliver the repository for searching and browsing. The tool so far has been aimed at curators or academics holding smallish collections who wished to deliver their repository online. However, it can hold larger collections as well. MSU are working with several large state organizations and museums that have very large collections.

The tool is written in PHP/MySQL and thus will run on any appropriate server perspective. From the client end it appears to work on all platforms via a standard web browser. It uses its own AA system, and so far there has been no attempt to link it to another.

Standards predominantly come into ProjectBuilder via its use of metadata. This is based on METS and Dublin Core but the user is free to change the metadata standard to suit their own requirements. The in-built thesaurus is unique but adaptable, and the project is looking to use LoC and/or Getty. The software imports and exports metadata in Dublin

XML using its own schema. The repository can handle all file formats for the digital objects.

4.3.3 ProjectPad

Adapted from 'Notebook', ProjectPad is a web-based system for scholar or student collaboration and media annotation. The tool's technology consists of Java server software that works in tandem with a standard HTTP server and a library of Macromedia Flash ActionScript classes. Client modules communicate with the server via socket connections (Flash's XML sockets) and generally retrieve content via the HTTP server. ProjectPad integrates Fedora for searching and organizing materials from digital repositories creating a robust digital library architecture for spoken word holdings. XML feed technologies (RSS and ATOM) have recently (July 2005) been implemented into the tool as part of the development of a user-friendly Front End development.

Integrated audio annotation helps students analyze and organize their notes about spoken word materials and lets students and scholars collaboratively share their observations. The audio annotation tool can be used to play and annotate MP3 clips playing directly through the interface (or may control a RealPlayer elsewhere on the page). The user can add notes (similar to Apple's 'Stickies') to the timeline by clicking the Add Note button. The new note is initially positioned over the playback indicator and to play the associated audio the user can click on the speaker button at the bottom of the note. It is also possible for several users at add notes to a single timeline synchronously as any changes that are made to the timeline are communicated to the server strait away. Once annotated the annotated audio can be integrated into a scholar's (or a student's) web-based project.

The tool has been trialled in a number of settings including social work courses at Strathclyde University, Indian History at Columbia, 'Imapact of technology' at Northwestern, and English language teaching at Università di Bologna.

Future development of ProjectPad includes fine-grained coding and transcript synchronization for use in spoken word research and the annotation of video and images as well as audio. Authentication using Shibboleth is being investigated as is the Java portlet demonstration gateway using the Java Specification Requests 168 and 170 Portlet Specifications (JSR 168 and JSR 170). Additionally, developers are working in conjunction with Macromedia and TechDis to improve the accessibility of the tool.

ProjectPad is currently at roll out stage and it is planned that eventually the software will be released under the GPL.

4.4 DART

This project aims to explore the potential of digital resources for the teaching of undergraduate anthropology.

4.4.1 *What's Going On?*

This tool asks students to watch a video clip, and by gradual exposure to extra information via subtitles and hotspots to other resources, answer the question 'what is going on?'. The students are required to write c.300 words each week describing what's going on from the information presented to them. The amount of on screen information increases over a 3 week period, during which time they gain further insight from the lectures and tutorials. This aims at representing the conditions of real ethnographical study in the field, in which information builds on previous knowledge.

The system utilises Flash which reads in a series of XML files. These files (using a home-devised schema¹⁰) hold information about the subtitles, in and out points, and hot spots. The system then brings these files in and collates them with the Flash movie (the system requires all video clips to be converted to Flash format). Using a standard text editor then the subtitles and hotspots can be altered. An experimental interface to make this easier has been developed. The files are delivered via a standard web page but this requires the Flash plug-in. The tool could potentially be reused by any other discipline that wants to quickly insert and control footnotes in video clips.

4.4.2 *Betsileo Rice Challenge*

This self-standing tool exposes anthropology students, via a simulation, using the context of rice farming, to the importance of contextual land factors, socio/economic status, and education. The user is asked to make a series of decisions about the farming method, and the social interactions of a particular character, and on a turn-by-turn basis is presented with the outcomes. Students are asked to write a 200 word report on the simulation, and then asked to choose a different character with a different social status and repeat the process. Finally they write a report as if it would be presented to a development agency.

Users authenticate via existing WebCT log-in details through means of a cookie (but these are held separately within the simulation). The simulation itself is written entirely in PHP/MySQL and delivers standard HTML (without any plug-in required). The content, however, is not separated from the presentation and thus repurposing would be difficult.

4.4.3 *Investigator (Kolkata Explorer)*

This single tool aims to introduce students to urban ethnography, allowing them to build up evidence to answer particular hypotheses or questions set by the lecturer. The example used is that of Calcutta (Columbia are looking to employ this tool for Delhi), and focuses on spatial research using maps as the core interactive tool. The tool endeavours to engender a new level of analysis of information related to individual characters by the students.

¹⁰ SMIL was looked at but did not seem suitable.

The user begins by choosing a character living in Calcutta and is asked to explore information about them and then to write a report. Students get access to maps, personal information, and online scholarly resources, etc., thus introducing them to urban ethnography research skills. Material can be added to a personal portfolio and annotated; thus building up a set of research resources.

The tool is driven by XML (but with a home-developed schema) and assembled in Flash. A PHP/MySQL database is used for saving and uploading of portfolios.

No metadata has, as yet, been applied to any of the above tools. However, LSE are looking into applying LOM so that the tools can be catalogued in the system used by project partners at Columbia University.

4.5 DIDET

The project proposes the development, implementation and use of a testbed to improve the teaching and learning of students partaking in global team-based design projects and combines the use of digital libraries with virtual design studios.

4.5.1 LauLima

Although listed under a single title, LauLima could be seen as two distinct products. First there is the LauLima Learning Environment (LLE) which itself is a modified version of the open source product – TikiWiki. Then there is the LauLima Digital Library (LDL). Both products are integrated as we will see but could be considered (and disseminated) separately if required.

The overall aim is to allow students studying design to capture the knowledge and output they and their groups produce, both formal and informal. The LLE provides the Wiki environment for them to do this, and then the LDL (at the discretion of the academics and library staff holds a permanent record of this work).

Considering the LLE first, as noted above this is a heavily modified version of the PHP open source product – TikiWiki (TW). This had a lot of functionality, and was being used at Stanford, but clearly needed considerable modification for the project (other tools were considered but TikiWiki had the most to offer). PHP and open source were two key factors, as it allowed the team to quickly develop the product meeting the tight timescales. Modifications focused primarily around the access control. TW originally had a capabilities-based system, but the project required a much finer control than that. So modifications were to integrate a better permissions system (including the wiki pages themselves) down to the individual object level; and to be able to track all objects in the system, and associated permissions. It also allows easy organisation of project work in a

hierarchical structure (itself a change to the inherent organisational structure within TikiWiki).

The LauLima Digital Library (LDL) is for formal, legal, and permanent storage of the material produced in the LLE which can be searched by students and staff from within the LLE. The LDL provides more functionality to record metadata, controlled vocabulary (based on a modification of the INSPEC thesaurus), and browse and search facilities. The LDL in effect is the repository end of the LLE. Metadata is retrieved from the original object once it is proposed by the academic for storage in the LDL. They are asked to also provide some additional metadata. This is then passed to a Library and Information Specialist who provides greater cataloguing information. He or she at this point is also able to reject an item submitted or approve it for storage in the LDL/. Metadata is based on Dublin Core. LOM was investigated but did not seem suitable at the time, though this will be revisited. The project has also gained interesting experience with relation to copyright and data protection. The LDL has considerable functionality for displaying the metadata and this has been led by user trials with the students, academics, and LIS staff. At present it holds about 40 objects, but this will grow considerably over the next year.

The system is linked to the central authentication system at Strathclyde, but authorisation is held in the LLE itself.

The system is being used at the local department; as a knowledge management tool in Information and Resources Directorate (Strathclyde); and also in information literacy Centre for Academic Practice.

The following two tools were demonstrated as classroom applications as part of the DIDET project. Little development work was done on these tools:

4.5.2 Infomedia

Developed at Carnegie Mellon University, Infomedia is a suite of tools that work together to enable the storage, editing, indexing, searching, retrieval, and playing of digital videos. Using high quality audio and voice recognition software the tool also allows for automated speech-to-text translation, thus creating a powerful search facility to enable users to find more easily the sections of video that they need.

This digital video library must reside on a Windows 2000/XP system whilst the video indices are stored in a relational database (Oracle) and as yet has no web presence. Since its functionality relies heavily on various techniques of video-processing which can only be done using specific technology however the client interface is being developed using the .net framework which will make it possible to integrate it with other systems such as web browsers.

The tool has been evaluated in the context of several short engineering design exercises. Students were given a design task with the possibility to access the video library tool. The

duration of the experiments was about 2 hours each. The complete process was monitored, recorded on tape and detailed interview were conducted after the experiments. The tool was also placed in a kiosk in a design studio where students were engaged in a two week design exercise. The use of the tools was monitored through a video camera (to understand individual and group usage patterns) and system logs. DIDET are currently investigating the sources of ideas generated and tracking the use and influence of these ideas as design projects evolve. This is a comparative study looking at the affordances of a video-based system (e.g. Infomedia) with those of a text based system (e.g. SMETE).

4.5.3 SMETE

Developed at the University of California at Berkeley SMETE provides a web-based search interface for formal design documentation that allows further indexing of data. For the purposes of DIDET the query interface was altered to fit the specific engineering dataset that is used within the project.

The SMETE Open Federation has implemented a generalized federated search mechanism for educational digital libraries. The Search API is a set of Java classes and WSDL (Web Services Description Language) files describing the SMETE federated search service. The API is a SOAP (Simple Object Access Protocol) interface to searching the learning resources catalogued at the SMETE digital library. Records incorporate IEEE/IMS Learning Object Metadata.

5. Analysis

In Appendix 3 we have provided a matrix-down analysis of the various tools set against some of the main criteria for the JISC technical framework¹¹. As one can see, going on the information received, the projects have been working (in part) in synergy with the developing Information Environment of the JISC. As noted earlier though, when development started on the tools many of these guidelines were not available or in their infancy.

Referring back to our original criteria for this study an analysis of the tools used or developed by the projects (outside of general applications) leads to some positive conclusions.

5.1 Availability

Most of the projects plan to release their tools under an open source licence. There is some difficulty with tools developed in the US (e.g. MediaMatrix), but on the whole this would seem to be in hand. Support should be offered to the projects.

¹¹ Taken partly from <http://www.ukoln.ac.uk/distributed-systems/jisc-ie/arch/standards/>.

5.2 Interoperability (see Appendix 3)

Bearing in mind the timing of the projects (drafted in 2002, started in 2003) when discussions and thinking surrounding interoperability standards related to the JISC ELF were in their infancy, it is refreshing to note how much engagement there has been in this area. Most projects are attempting to store their content (notably metadata) as XML, and wherever possible have looked at existing standards and used them or adapted them. Divergences from the 'standards' seem to be justified. In addition, now that the discussions have progressed further all of the projects were looking to see how they could engage more thoroughly with these in the remaining two years.

5.3 Functionality, Applicability, Sustainability

The tools have been built with user needs in mind related to the specific discipline-focus of the project, but in most cases the aim has been wider, i.e. to produce tools that may be applicable to a wider range of subjects. Indeed there is evidence already beginning to emerge from the projects that these tools are being used by other areas, and clearly many of them have the potential for wide dissemination and applicability. Of the tools analysed in this report we would point to:

Toolkit for Learning Activity Designers – wide potential use in all fields of learning activity design. Would complement existing work in learning design under the JISC e-pedagogy strand.

ConceptVista – although originally envisaged as a subject-specific tool this aligns well with recent work under the JISC e-pedagogy strand into the use of concept/min-maps for learning design.

ProjectBuilder – this will prove invaluable to people who wish to quickly create a small repository with tight (but easy to use) controls over metadata. JISC IE projects (such as the work on digital images) should be alerted to this as it fills a niche market, presenting a tool that can be used by the average practitioner who does wish to employ metadata but does not command the resources to pay cataloguers or develop sophisticated searching/browsing tools. To facilitate this some existing metadata schemes (e.g. EAD, METS) should be included with release.

ProjectPad – an extremely powerful tool that will be of use to anyone who utilises sound, video, graphic files in their teaching and wishes to enable learners to manipulate these efficiently and effectively.

MediaMatrix – an extremely useful tool of interest to anyone who uses remote sites and digital objects in their teaching. Some issues remain over licensing.

What's Going On? – this has potential as a quick and easy way for practitioners to subtitle video files and control the release of information. A preliminary interface to allow this to be performed easily has been developed, but completion of this should be encouraged

LauLima – taken separately or together this tool has been developed to provide extensive functionality. It ties in well with emerging work by the JISC on digital repositories, but also with collaborative learning as looked at by the JISC e-pedagogy strand.

In most of the projects issues of accessibility have been considered to some degree. Project teams should continue to work towards developing accessible tools wherever possible in line with SENDA legislation (UK) and consult Web Accessibility Initiative (WAI) guidelines.

All of the projects have been considering sustainability. In some cases this has led the development projects and technologies chosen, but in most cases this has been reflected with staffing structures. The projects have seconded staff to the development work wherever possible as this allows the expertise to remain at the institution after the projects have finished.

In summary though we must return to our opening remarks. The fact that these tools have been developed with such potential for wider use, bearing in mind the original criteria for the funding award and the timescales involved, should be applauded.

6. Recommendations

As well as the specific notes on some of the tools (above) we present now a series of recommendations for JISC. If possible these should be enacted over the next year, to allow the projects in their final year to benefit from this additional dissemination.

6.1 Specific Recommendations for JISC

6.1.1 When entering into a partnership with a collaborating body elsewhere the criteria by which the projects will be evaluated should be synergised. For example, it could be agreed that all products produced under the initiative will be released as open source, or all projects will have to engage in some form of evaluation and reporting process, or all projects should adhere to emerging standards.

6.1.2 UK projects should be encouraged to deposit all the learning objects they have developed within JORUM.

6.1.3 It is important that information about these tools is disseminated. First, other JISC projects should be alerted to their availability to provide the potential for reuse (see 6.2.3). Second, the potential for these tools should be relayed to practitioners in a manner and language understandable by them. Possible suggestions that spring to mind are workshops or guides on ‘Using audio or video in your teaching’ (demonstrating ProjectPad, What’s Going On?, and/or MediaMatrix); ‘Creating a quick online collection’ (ProjectBuilder, LauLima); ‘Collaborative learning and reflection’ (LauLima, Reflective Diary); ‘Designing effective learning activities’ (Toolkit for Learning Activity Designers), etc. These should use existing networks such as the HEA Subject Centres,

BECTA, TASI, etc.

6.1.4 JISC may wish to consider a follow-up ‘adopters’ call for projects in which funding is awarded to institutions who specifically take up one of the tools used/developed in the ‘Digital Libraries in the Classroom’ scheme and embed them into their own teaching.

6.2 Availability of the tools

6.2.1 All of the projects should be encouraged to release their tools as open source products via Sourceforge. Money from the dissemination funds should be put towards (in part) preparing full technical documentation, and tidying up interfaces.

6.2.2 All of the projects should liaise with OSS-WATCH to discuss the most appropriate licence.

6.2.3 A single page under the JISC’s web site should include brief summaries of the projects, brief descriptions of the tools (including technical specifications), links to more detailed user documentation and links to downloads on Sourceforge.

6.3 Interoperability

6.3.1 UK projects should liaise with CETIS and UKOLN to discuss what modifications could be made to their tools to make them more compatible with emerging standards.

6.3.2 Major work on making the tools conform to the emerging IE guidelines can not be assumed to come out of existing budgets for the projects. If additional work is identified that will bring the tools in line with the IE then additional funding may have to be found.

Appendices

Appendix 1: Survey

Digital Libraries in the Classroom Projects: Tools survey [Exit this survey >>](#)

1. Tools

This initial survey is part of the evaluation of the JISC/NSF- funded Digital Libraries in the Classroom Programme. We aim to collect information about any **tools** that you have delivered as part of your project. For instance, these might include communication or management tools, or ones specifically created for your project. Do not include tools used to simply help basic admin such as Microsoft office and e-mail applications.

Please answer the questions below in as much detail as possible. Thank you for your time.

* 1. Your name:

* 2. JISC/NSF project name:

3. What were your requirements when choosing/developing tools to deliver as part of the project?

4. Briefly list the tools that you used to meet these requirements.

For each tool please state:

- if the tool already existed or whether it was developed / adapted for your own needs.
- if the tool is open source
- if the tool conforms to any standards.
- a url to further information about the tool (if applicable).

e.g. Moodle, an existing open-source course management system (<http://moodle.org/>) used for communication between teachers and learners. It conforms to HTML, XML, XHTML, SCORM, Shibboleth . . . etc. (see <http://moodle.org/forum/discuss.php?d=24420>).

5. Did you evaluate any other tools to deliver within the project but discard them because they were not suitable?

For each tool, please give:

- the name of the tool
- a url to further information (if applicable)
- the reason for discarding the tool.

6. Do you have any thoughts about how any of the tools that you used may apply to the [JISC e-learning framework](#)?

Done >>

Appendix 2: Interview Schedule

Description and Objectives

1. Is this a single tool or a suite of tools?
2. What was the tool originally designed to do?
3. What aims was it designed to meet?
4. Has it been modified in any way to meet these aims?

Technology and Development

1. What was used to develop the tool?
2. What platforms does the tool run on?
3. What downloads/plugin-ins does it require for use?
4. How technology dependent is the tool?

Interoperability and Standards

1. Does the tool conform to any standards? If yes, how has this been tested?
2. How accessible is the tool? How has its accessibility been tested?

Usage

1. How has the tool been evaluated in terms of its usability?
2. How has the tool been evaluated in terms of meeting its functionality or learning goals?

Future use

1. Can you think of any ways that the tool could be applied to other learning environments?
2. Are there any future plans for development?

Appendix 3: Interoperability Matrix

Where fields have been left blank the standard has not been used, is not available, or information is missing.

	Standard Web Programming language used	Distributed searching Z39.50 version 3 [13] or SRW/SRU	Use of Open Standards for data interchange	Open-URL O.1 or above	Authentication	Metadata	Cross Platform	Accessibility testing
Toolkit for Learning Activity Designers	YES		YES		INTERNAL	IMS LD level A + extra fields	YES	LIMITED
Reflective Diary	YES				LDAP		YES	LIMITED
Concept Vista	YES		YES		NONE	OWL	YES	
MediaMatrix	YES				INTERNAL		YES (Latest version only)	LIMITED
ProjectBuilder	YES		YES		INTERNAL	Dublin Core and METS with own schema	YES (Latest version only)	
ProjectPad	YES	YES	YES		Shibboleth under investigation	European Broadcasting Union's implementation of Dublin Core (in METS wrapping) work on UK LOM via IntraLibrary	YES	YES
What's Going On?	YES				INTERNAL		YES	LIMITED
Betsileo Rice Challenge	YES						YES	LIMITED
Investigator (Kolkata Explorer)	YES						YES	LIMITED
LauLima	YES				INTERNAL/ EXTERNAL (Radius/ LDAP)	Dublin Core + other fields	YES	Ongoing, WAI AAA compliant menu system
Infomedia								
SMETE		YES	YES			LOM	YES	

