Online Learning Support Tools

Kevin Caley & Quang Luong

School of Education, The University of Nottingham,
Jubilee Campus Wollaton Road, Nottingham NG8 1BB, United Kingdom
kevin.caley@nottingham.ac.uk, quang.luong@nottingham.ac.uk

Abstract

This article outlines three of the online-learning support tools used in the e-Educator, i.e. the Audio Recorder (AR), Workspace and Learning Activity Analysis Tool (LAAT), emphasising the pedagogic rationale behind the development of each tool. It looks at the origins of these tools and why there was a perceived need to develop them. Each section then looks at the components of the tool in question, how it was constructed and how each tool will develop beyond the end of the e-Educator project. The article ends by looking at the use of VLEs from the developers' points of view and a look into what the future holds for such tools, with an ultimate cautionary note looking at the costs of production.

Abstrak

Artikel ini mengariskan tiga alat sokongan pembelajaran atas talian yang digunakan dalam e-Educator, yakni perakam audio, ruang kerja dan Alat Analisis Aktiviti Pembelajaran (AAAP), yang menekankan alasan pedagogi di sebalik pembangunan setiap alat. Ia juga melihat terhadap asal usul alat-alat ini dan kenapa wujudnya persepsi terhadap keperluan untuk membangunkan alat-alat tersebut. Setiap komponen alat-alat ini akan dibincangkan dan bagaimana ia dibangunkan dan juga penggunaan alatan ini selepas projek e-Educator tamat. Artikel ini diakhiri dengan melihat penggunaan VLE dari pandangan mereka yang membangunkannya dan melihat masa depan penggunaan peralatan tersebut dengan nota persediaan terhadap kos yang terlibat untuk menghasilkannya.

Background

The context for this article is the e-Educator project within the e-learning International Sino-UK programme funded by the Higher Education Funding Council for England. This involved collaboration between The University of Nottingham, UK and Beijing Foreign Studies University, China to develop a module for training tutors of online learners - one that

could be adapted for use in a variety of contexts. The module was piloted at the School of Distance Education, Universiti Sains Malaysia, Penang. A fully functional demonstrator is provided as part of the e-Educator project case study on the eChina-UK programme website www.echinauk.org. This article appears in the second of two Special Issue of the Malaysian Journal of Distance Education that provides a comprehensive overview of this project.

Introduction

The School of Education at the University of Nottingham has been involved in the development of tools and courseware within the eChina-UK programme. This paper summarises the functionality, possible use and further implications of three online learning support tools that were created for these courses, the Audio Recorder (AR), the Workspace (Workspace) and the Learning Activity Analysis Tool (LAAT). It should be stressed that these tools have been developed initially for use within Moodle (www.moodle.org), the chosen Virtual Learning Environment (VLE). It was decided from a pedagogic perspective that these tools needed to be accessible from within each web page of the course for consistency and to aid familiarisation by the students involved on the course. The tools occupied a toolbox panel within the module which sat above the navigation panel on each page. The toolbox incorporated newly developed tools alongside proprietary ones already available in Moodle such as the Discussion Forum and Chat facilities. Because the development of the tools were pedagogy-led (specifically learner-centred), rather than functionality-led, there have been major implications in the development of their appearance, as well as in terms of the ease of use by the students. One of the increasingly obvious considerations that affected the choice of tools developed has been the inability of institutes to afford expensive proprietary software tools that would facilitate the creation of a worthwhile learning experience. Early on, it became clear that the tools required for such a dynamic, learner-friendly course just did not exist. Both these factors led to the development of the suite of 'free' tools presented here (these are offered either as freeware or open source). These tools can be seen in more detail on the eChina-UK website (www.echinauk.org).
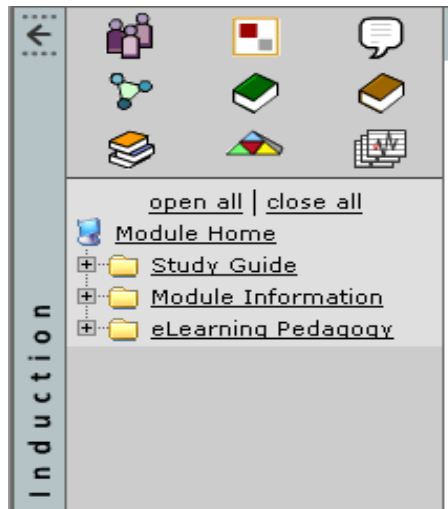
Figure 1   Toolbox within the e-Educator module.
Shown (from left to right) are: Discussion Forum, Bulletin Board, Chat Room, Workspace, Reflective Journal, Notebook, Bibliography, LAAT, Audio Recorder

The Audio Recorder (AR)

Overview

The Audio Recorder is a Flash-based MP3 recorder that can be accessed directly from a web browser and save files to a local folder. The AR was originally developed as part of a concept for an online learning activity supporting foreign language learners to practise their pronunciation, as well as share the students' best recordings with their (online) peers and tutor. The initial concept involved a series of bouncing ball animations over pre-defined sentences for the user to follow and record their own voice. It became clear early on that a more generic audio recording tool was required, because a utility for sharing audio files would enhance the learning process in many different areas, not just in language learning. For example, providing audio files to students in order to give feedback on their assignments is a valuable method in supporting formative and summative feedback (Caley, 2007). It has also been noted that students view audio feedback in a different, more meaningful, way from traditional written feedback, with the ability to pause and replay such files being a

distinct advantage when viewing the tasks being reviewed (Merry & Orsmond, 2007). Furthermore, feedback via audio is less time-consuming than the more traditional, hand-written/typed methods (Merry & Orsmond, 2007) as well as having the perception among students and tutors alike of being 'more immediate'.

It was decided that the AR should be accessed from a web browser so that it could be integrated into any online course subsequently. Of course, this same process could have been accomplished using various desktop tools that allow users to make an audio-record (e.g. Windows' Sound Recorder or Audacity – an open source desktop software for recording and editing sound files). However, these methods require the user to be highly technically-literate: in the latter scenario, not only would the user need to remember to move files between folders, but also to negotiate several different software applications, switching between offline and online programs to record, compress and save the file into a standard audio format before uploading it to the student's server space (wherever that might be) and sharing it with peers and tutors either through email or through the use of a VLE. The main objective of the AR, therefore, was to simplify the process of recording, compression and file management by creating a web-based, simple-to-use recorder that could save sound files in MP3 format, with the resultant file being easily uploaded and shared with peers and tutors.

AR Technology

The AR uses a Flash interface and ActiveX component to record an audio wav file in conjunction with the LAME MP3 encoder to convert the file to MP3 format. The current tool has two formats:

- Configurable folder path to save MP3 files using a standalone server version which can be downloaded and installed onto a web server. So far, this has been tested successfully on Apache and IIS web servers, hence will work on Linux and Windows platforms;
- a version which is fully integrated into Moodle, and currently available for versions 1.6 – 1.9 of Moodle. This version interfaces directly with the Gradebook in Moodle so that the students can record audio files and send it to their tutors for grading.

A conscious pedagogic decision was made to restrict the size of the audio files produced by the audio recorder, which also helped functional considerations. It was agreed that an upper limit of four minutes for each audio recording should be applied, firstly to help students and tutors to focus on the topic and secondly to keep the file size relatively small. A four minute recording creates an MP3 file size of approximately four Megabytes, whilst a wav file of the same time-length would create a file about twice that size. The Audio Recorder can be accessed and used at the following address (http://disseminator.nottingham.ac.uk/ar/). Here, download files are available for the web server and Moodle versions if a user wishes to install these on their own server, though there is no need to do this to use the AR, which is offered as a free Web Service.

Following feedback from the Moodle community, the tool has been enhanced with additional features, including:

- A facility that allows students to upload multiple audio files to the Moodle Gradebook;
- A facility that allows tutors to provide audio feedback through the Moodle Gradebook itself;
- Configurable file size limit;
- Configurable folder path to save MP3 files.

AR Limitations

The major limitation of the current version of the AR is that it can only be used within Internet Explorer and its derivatives, since it uses an ActiveX control to create the MP3 audio files. At the time of development, it was felt that this was the quickest way to create this tool and make it widely available to the education community. It was felt that, for the e-Educator project, its use within Internet Explorer would suffice since the majority of users in China use Internet Explorer and Maxthon – a web browser built upon the Internet Explorer platform (Lu, 2007). The use of Red5 – an open source Flash streaming server was also explored. However, this technology was still in its infancy at the time of developments.

The Future of the AR

Since releasing the AR as an open source tool to the wider e-learning community in December 2005, there has been a growing demand for its use in both Higher Education and Further Education institutes worldwide, with around 400 downloads per month. This has led to a number of requests for the tool to be further developed for the Firefox browser and to have in-built file upload capabilities. Other ideas include development of a more interoperable format to allow group and discussion functionality to be attached so that a lesson can be created around a particular audio track with the addition of audio feedback and comments. Further funding and resources are being sought to progress with these developments.
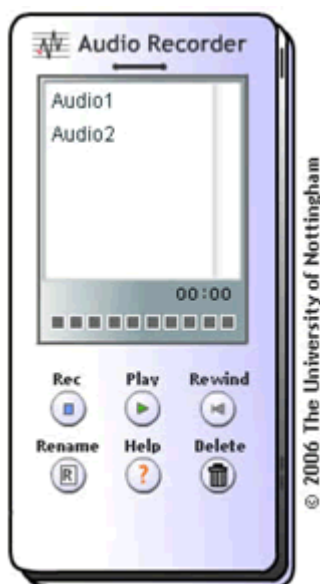
Figure 2   Visual representation of the Audio Recorder, revealing the presence of two audio files ready for playing.

The Workspace

Overview

The Workspace is a database-driven tool with a Flash interface. It is designed to be accessed directly from a web browser or integrated into a VLE such as Moodle. The concept design includes three views - the **Student View**, **Tutor View** and **Administration View**. Within the **Student View** are included the *Personal Archive* (a private space and record of the student's work), the *Portfolio of Submitted Tasks* or '*PoST*' (a record of the files submitted to tutors and peers) and the *Peer Review* (items received from other students for feedback / peer assessment). The **Tutor View** is similar, but with some minor additions (for instance, they can view a list of their students and those students' submitted files). The **Administration View** does not rely on the Flash interface - this is purely a section to allow integration of the Workspace within particular courses. In addition, a series of simple-to-use tools are available within the Workspace, including the Reflective Journal, Notebook and the Bibliography tool.

None of these tools are particularly innovative on their own, because many desktop applications could be used to achieve similar tasks such as creating a reflective journal entry or storing a file. However, to support clarity of purpose and ease of use, these tools have been included as separate elements within one area in the VLE, the Workspace**.** Pedagogic principles developed within the project dictated that there should be explicit separation of these elements, a practice that has continued elsewhere within the e-Educator Tutor Training materials, e.g. with the distinction between the asynchronous discussion fora and bulletin/poster boards, and the synchronous chat rooms. With respect to the Workspace, it has been felt for a long while that there was a need for a single online work area for students to access saved files and information from interactive tasks and to share these with their peers and tutors (Caley, 2007; Joyes, 2007; Chan *et al.*, 2001). This would aid online learners to concentrate on the learning rather than having to negotiate several different applications and storage facilities before posting these files independently to peers and tutors. Within the eChina-UK (Nottingham) projects, the Workspace toolset was created to service both undergraduate

and postgraduate studies, focussing on reflective writing, autonomy and peer assessment.

It is important also to differentiate the Workspace concept from that of an ePortfolio: 'ePortfolio' tends to refer to a (rather monolithic) development concept that centres on a range of functionalities to support life-long learning and archiving of students' work throughout their development, whilst the Workspace was developed around the granular unit level of a course, something which appears more appropriate to the modular nature of university courses and student perceptions.

Description of tools and areas within the student view

- **Personal Archive**: The Personal Archive is a private area for students to access results of their online tasks, uploaded files, bibliographic entries, reflective journal and notebook entries. From here, the student can select and submit files to peers and tutors for feedback and review. It should be stressed that tutors (and administrators) do not get to see what is in the archive of individual students. The onus is ultimately on the student to send files for assessment. The archive facilitates a more reflective approach to what should be submitted.
- **Portfolio of Submitted Tasks (PoST)**: The PoST displays a record of the files submitted to peers and tutors. It is possible to un-submit files (i.e. remove files from the submission queue) as long as they have not yet been viewed by the recipient in the meantime.
- **Peer Review:** The Peer Review displays files that have been sent to the student by other members on the course, enabling a process of peer review.
- **Notebook and Reflective Journal Tools:** The Notebook is a place for students to make short and *ad hoc* notes. On the other hand, the Reflective Journal is commonly linked to a specific activity or task. Both types of writing tool can be accessed and edited any number of times, until submitted and opened by a tutor or peer reviewer. Although similar in functionality to that of the Notebook, there is an important pedagogic distinction implemented here, with the Reflective Journal being a place for students to write reflectively (Joyes, 2007).
- **Bibliography and References Tool**: This tool was designed as a simple online application for students to create a bibliography list. The

tool allows students to select from the bibliography and create a reference list which could then be submitted to peers and tutors, either as part of a larger reflective 'document' package, or as a stand-alone file. It is comparable to a simplified online version of EndNote – a commercial reference management system. Such a tool was felt useful to aid academic writing at a tertiary level (Joyes, 2007).

Workspace Technology

The Workspace uses a Flash interface in conjunction with PHP scripting and MySQL database. There are currently two formats:
- a stand-alone server version which can be downloaded and installed onto a web server.
- a version which is fully integrated into Moodle as a block/component and currently available for versions 1.6 – 1.9.

The Future of the Workspace

There are plans to develop the Workspace into smaller modules that can be accessed via Web Services, separating out each tool, such as the Bibliography and Reflective Journal, whilst maintaining the same style and functionality. In this way, these tools become more interoperable with other systems and could either operate as single self-contained applications or be combined seamlessly into one larger application.
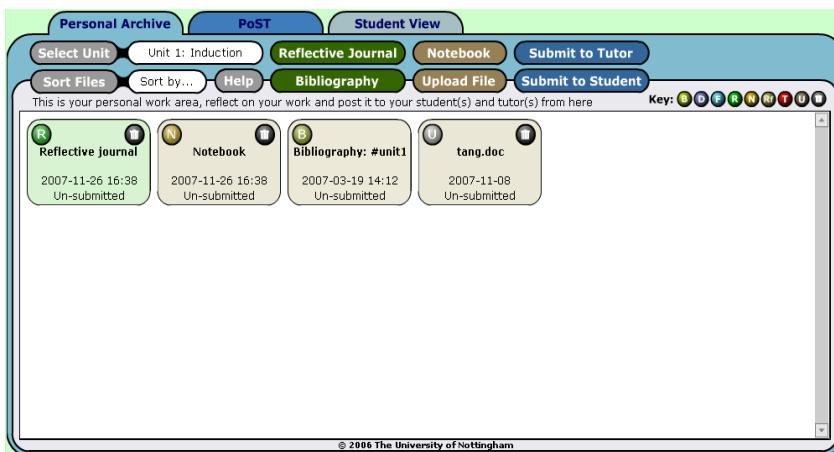
Figure 3 Student's view of the Workspace, open at the Personal Archive

The Learning Activity Analysis Tool (LAAT)

Overview

The LAAT was conceived for use in the e-Educator Tutor Training module. The tool is based around Activity Theory (Leont'ev, 1981; Vygotsky, 1978) which states that an activity consists of a subject or person and an object (objective) mediated by instruments, tool sets, e.g. a discussion forum, or a study approach (Joyes, 2007). The activity is governed by a set of rules and expectations and the division of labour is influenced by the role of the community members (tutors and peers). Engeström (1987) devised a visual model to describe such an activity system (Figure 4).
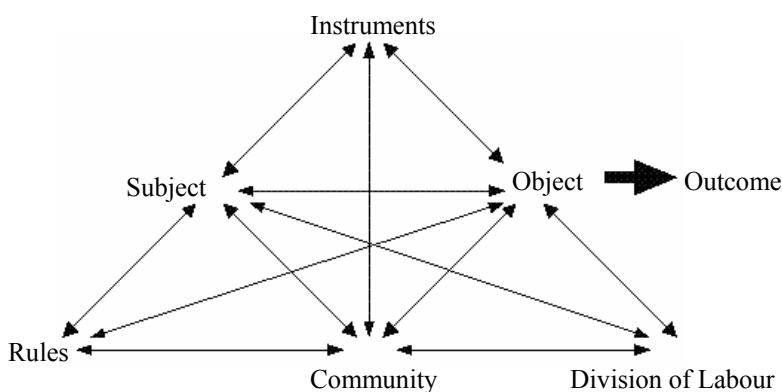
Figure 4   Activity Analysis Model (adapted from Engeström, 1987)

The visual interface of the LAAT (Figures 5 and 6) is based around this model and provides a conceptual framework for activity designers or online tutors to analyse a learning activity by entering each component part of this 'LAAT triangle' and reflecting on a set of related questions (Figure 7). They then consider the range of strategies that might be used to support their online learners. It is important to note that use of the LAAT requires an iterative reflective process - changes in one component part may affect another component part and hence requires re-assessing. For instance, an activity designer or online tutor may decide that an activity requires an additional element of collaboration which would require re-assessment of the rules in relation to the division of labour and

may require additional sets of tools. Relationships between different activities will also be important – one activity may rely on skills or content acquired in another (Joyes & Wang, 2007).

On completion of the LAAT, users share and discuss their analyses with their peers in order to develop ongoing understanding of effective practice. Finally, the tool automatically collates and prints to PDF format.

The tool can also be used in a wider context to analyse any learning activity – one might use it to plan a tennis training session for instance.
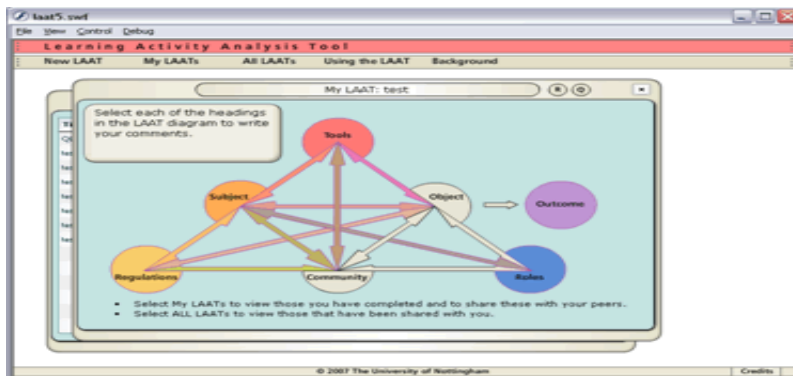
Figure 5   Visual interface of the LAAT

Figure 6   One of the questions posed within the LAAT, under 'Subject'
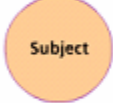
Component	Questions
Tools	Do the learners need support in selecting and using the tools that might be useful to use?
Subject	Who are the learners? What are their backgrounds? How ready are they? Do they currently have the skills/knowledge needed to carry out the activity?
Object	Do the objectives need clarifying and how might this be achieved?
Regulations	What are the cultural norms involved? Is the activity compulsory or optional? Is the nature of the task something the learners would expect to carry out as part of their studies? How can difficulties due to any conflict in expectations be overcome?
Community	What is the nature of the learning environment? What are the learners' expectations in relation to community? How can their roles be supported?
Roles	Is there a need to support the learners in understanding and carrying out their expected roles?
Outcome	How will learners know if they have achieved the outcome? How can feedback be provided to support the achievement of the outcome? Is the assessment of the outcome aligned with the nature of the task?

Figure 7   LAAT questions (adapted from Mwanza, 2001, 2002).
These appear within the activity boxes

LAAT technology

Version 1.0 of the LAAT was created using PHP and MySQL and integrated into Moodle. Following a pilot of the tool with ten trainee tutors in China, 2006, it was felt that the application required a more intuitive and user-friendly interface. Work was then undertaken to create version 2.0, a complete re-design of the process of creating, viewing and sharing a LAAT. A Flash-based interface using the 'LAAT triangle' as the main navigation entry point to the tool was created to improve ease of use.

The Future of the LAAT

There are plans to develop the LAAT as a standalone web server version
which would require adding an authentication mechanism around the tool
(i.e. login username and password) and also group functionality to allow
administrators or course designers to create groups of students to analyse
an activity.

Discussion

These tools were developed at the outset with a pedagogic perspective in
mind to create a high quality learning experience (Joyes, 2007). The
course materials were to be relevant and encourage autonomy and sharing
of ideas and practice (Joyes, 2007; Sinclair, 2008). The online tools
therefore had to demonstrate and facilitate the same pedagogic principles.
The development process of rapid prototyping and iterative piloting
allowed for important pedagogic design principles to be embedded into the
tools. These design principles were not only decided upon by the
academics and technologists, but equally by its users.

The use of an open source VLE fostered innovation and flexibility in the
development process - it was important to be able to access and change the
VLE's scripts and database structure to enable the tools to be closely
integrated into the platform and thus providing an improved online user
experience. It was also decided that these tools would be released under an
open source licence to gain a better insight into how they might be
adopted in the wider e-learning community. This is particularly true in the
case of the Audio Recorder which resulted in the development of a much
improved learning tool.

The choice of PHP, MySQL and Flash were also important considerations.
PHP and MySQL are both open source software and are relatively easy to
master from a programming perspective, hence have a large following of
users. Flash has the benefit of being widely available across different
platforms, whilst maintaining consistent layout and functionality allowing
for design of visually appealing and intuitive interfaces.

The next phase for these applications is the push to gain mainstream
adoption within institutions. There is a huge challenge here to ensure

interoperability with institutional online learning environments, Content Management Systems (CMS) and user authentication systems whilst maintaining a flexible model so as not to constrain the pedagogy (Joyes, 2006). There are also calls for Web 2.0 principles to be embedded into the tools, allowing users to make the decisions over the creation of groups, discussions and content − around a topic, audio recording or LAAT activity, for instance.

There is, however, a price to pay for this approach to design and development of online learning support tools. The process is resource-hungry, requiring the involvement of a wide range of personnel (academics, designers, e-pedagogists, technologists and users) and the iterative nature of development requires continuous teamwork. In the case of the LAAT, there was a lot of coding and re-coding of functionality to ensure that the pedagogic requirements were met. It was also difficult to predict and plan for new features and ideas which emerged during this process. Developing the Workspace and AR in particular required redefining the specification on numerous occasions, and additional research had to be conducted into new and emerging technologies that might be incorporated into the tool. The notion of the forever-beta development model is very much prevalent in these tools. It is hoped that through all of this has emerged a set of innovative tools that match the learner's needs and enhance their online learning experience.

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