

# The LOC Tool: Creating a Learning Object Authoring Tool for Teachers

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## Abstract:

As technologies advance steadily into the educational sector so must teachers' technical skills develop as they learn to work with them and understand their affordances. Tools for creating interactive online learning materials as webpages or 'learning objects' often assume a high level of technical ability in the user as well as an understanding of how to design online learning materials effectively. Although keen to take on new technologies, the classroom teacher may lack these skills. A University of Southampton team have sought to address these problems by creating the LOC (Learning Object Creator) Tool, an authoring tool contains an embedded pedagogic template guiding development of effective online learning materials. A one-day training workshop is sufficient to learn to use it. This paper outlines the development of the LOC Tool, explains the underlying pedagogic approach and describes how it is used by teachers to create learning objects in their own disciplines.

## Introduction

With the embedding of more and more e-learning in higher education, there is a recognised need for tools that will allow teachers themselves to develop effective e-learning resources as simply and quickly as possible to serve their own needs. In 2006 the Higher Education Academy Subject Centre for Languages, Linguistics and Areas Studies (LLAS) together with a pedagogic expert in e-Learning from *eLanguages*, a research and development unit at the University of Southampton in the UK embarked on a Higher Education Academy Distributed e-Learning Programme (DeL) funded-project to develop the means to facilitate the production of interactive online learning materials in the form of 'learning objects' (LOs) by teaching practitioners. This project focussed on developing and delivering training in the creation of learning objects to both Subject Centre staff in order to act as enablers with an emphasis on promoting instructional design, and to practitioners in the first instance, and resulted in the production and testing of a simple pedagogically-enhanced template and *Dreamweaver* toolbar for the creation of basic 'learning objects'. This was accompanied by a simple training pack and workshop designed to both train teachers in the use of the tool and in the basic principles of e-learning, specifically learning object design. To accompany these deliverables the LLAS began the creation of an online support area to provide help in the use of the tool and more importantly to bring users of the tool together to share materials and ideas. In 2007, a further development phase resulted in the creation and piloting of an independent tool for authoring learning objects and a full training workshop and support package, which aimed to provide an authoring tool which was easy to learn to use and to provide the pedagogical guidance that teachers making online learning materials for the first time require. An enhanced online support area is also now being used by a community of practice - teachers representing a range of language-related disciplines and from institutions across the UK - to share their creations and ideas on learning object development and the affordances offered by the LOC Tool as it reaches its final phase of development.

This paper will outline the development of a learning object authoring tool for teachers, beginning with the pedagogic basis and concluding with the lessons that have been learnt from trialling of the LOC Tool. It will take a brief look at how this model for facilitating teacher-led development of e-learning resources in Higher Education might be cascaded down to the mainstream of teacher-developers both in the UK and further afield.

## **Learning Objects and their Pedagogic Basis**

Since 2002, *eLanguages*, a research and development team based in Modern Languages at the University of Southampton has been developing interactive online learning materials in the form of learning objects. These form the basis of online courses and resource sets (toolkits) for international/non-native speaker students and for British/native speaker students primarily in study skills and language development. Based on extensive research with student users of the learning objects and following a number of template revisions, an effective pedagogic design model has emerged, which has informed the development of the LOC Tool. The key features of the learning objects created by *eLanguages*, which have influenced the design of the LOC Tool are that they:

- focus on a learning point – language, skill, topic or theme-related
- are activity-led
- engage the student in reflection and active involvement
- provide ‘scaffolding’ of students’ learning with lots of feedback
- combine multiple media
  - text, audio/ video links, web links, images etc.

A number of other desirable features can be added to these, which increase the scope for re-use (reusability) of any online learning materials that are produced. These are that they are:

- self-contained and in this sense, separable from any individual context of use
- consistently styled and sized
- interoperable so they can be used on a variety of platforms/VLEs

So, this model for learning objects proposes that they are self-contained chunks of online learning material of similar size or granularity, offering activity-based learning, and comprising a series of interactive linked tasks and their associated digital resources or ‘pedagogic assets’ (PAs) such as audio and video files or texts.

Given that each LO focuses on a learning point which may be complex, it can be presented through several staged activities, allowing for reflective, productive and practice-type activities. An activity-based approach is used, combining multi-media assets and aiming to engage the student in a ‘learning by doing’ type of interaction and active reflection, as they also listen, view, read or write. The activities are enhanced with feedback, which may include comments and explanations as well as answers, in order to support learning. Optional help in the form of hints and examples is also available to support students’ effective engagement with tasks and there may be links to further web-based practice or reference material associated with the learning point. Productive tasks are personalised where possible and all feedback is student-activated.

The pedagogic design of the learning objects seeks to draw on key elements and processes identified in Laurillard’s model for teaching and learning (Laurillard, 2002). Her ‘Conversational Framework’ provides a model for using learning technologies effectively as part of the learning process in Higher Education. At a micro level, the pedagogic design aims to reflect the various elements identified by Laurillard’s DAIR model (discussion-adaptation-interaction-reflection). This includes task ‘interaction’ and ‘reflection’ about the learning concepts involved; ‘discussion’, which in the LOs allows for an internalised process through student engagement with the activities and their feedback, and ‘adaptation’ of students’ understanding through their engagement with a sequence of increasingly challenging activities.

These features have been distilled in the pedagogic design for the LOC Tool, and guidance for the teacher-developer is incorporated into the template to help them produce online materials that have the potential to be the most effective for learning.

## Designing a Tool for Teachers

An important driver in the design of the LOC Tool was the desire to provide users with sound guidance in how to create pedagogically effective online learning materials. Many of the commercial tools currently available focus primarily on providing users with the technical means to create web pages containing different types of interactive tasks, and little else. Our aim was to embed some of the pedagogic guidance in the learning object template itself which forms part of the tool as well as to develop an authoring tool that was relatively easy for teachers to learn to use. Thus, the user is pedagogically guided through the process of developing a learning object around their chosen learning point and providing an adequate level of task support and feedback for the student.

The image shows a screenshot of the LOC Tool template. At the top, there is a text input field with the placeholder "Insert your learning object title here". Below this is a large black rectangular placeholder with the text "Your image will appear here and will be resized to 200 pixels high or wide." To the left of this placeholder is a "Browse for image..." button. To the right of the image placeholder are two text input fields. The first field is labeled "Introduction" and contains the placeholder "Write your introduction to the learning point or topic here." The second field is labeled "Objectives" and contains the placeholder "Write the learning objectives or learning outcomes here." Both text input fields have scroll bars on the right side.

Figure 1: A view of part of the LOC Tool template containing pedagogic guidance for the developer

At the same time, the tool user is given freedom within the template to select the kind of task type they want to create and to choose the number of activities they feel they need to include for the learning point. They are also given scope for changing the language of instruction and can make choices concerning the appearance of their learning object for example, by selecting from a range of pre-developed style sheets.

The template was originally developed using the Macromedia *Dreamweaver* software. This version of the template consisted of a pre-written page of HTML code, with regions into which the LO developer could type their appropriate text. However, it was found that even when locking regions of the code from being edited, the technical skills required to include such items as option checkboxes etc. often meant that the developers would create web pages with errors in them. This meant that developers frequently needed either technical support, or had to learn technical skills themselves - a slow process. This prompted the search for an easier to use solution for the development template. It was decided that using a software development tool (in this case Microsoft Visual Basic), a custom piece of software could be created which would simplify the whole process for the end-user. The principle would be that the user could be presented with a series of boxes and options for their Learning Object, and these would be wrapped within a pre-written webpage template when saved. Several interfaces were considered, including a wizard-style series of questions, but it was decided that the simplest presentation format would be to show the LO developer a screen mirroring that output webpage as closely as possible, with text entry boxes placed where the output text would appear.

An initial proof-of-concept version was developed very quickly, but there were a series of criteria which the LOC tool needed to fulfill if it was to be useful. A list of features was identified for the initial version:

- Bold and italic functions
- Allow an image insert
- Four types of task display options; checkboxes, 'radio' buttons, text-entry boxes and dropdown lists
- Feedback popup boxes

- Links to other websites or dependent resources

The first version incorporated all these features, but it was soon realised that it would be too complex and lengthy to develop a truly ‘WYSIWYG’ editor. A compromise was found whereby the use of the various options (bold/italic/inserting links) was easy, but was accomplished by inserting the appropriate HTML codes at the cursor position. Using a custom tool meant we could add some extra functionality improvements over the original template including the ability to auto-resize images to fit into the page template and offer a selection of different web page styles when saved. The tool was also designed to support multiple languages using the unicode standard and supports Chinese, Arabic and eastern European character sets if the user has the appropriate languages installed on their computer. The output was designed to meet current web standards and look identical in a range of web-browsers.

After trials with a small user group, feedback on the use of the tool was collected and refinements and features added. The use of the specific pedagogic template reduced technical errors considerably. In response to feedback, several extra features were added including a more robust referencing system which allowed the user to insert references anywhere in the text. Working with language teachers also highlighted the need to have editable title boxes to allow them to create an LO in any language. Also, in response to user requests, we added two additional stylesheet options bringing the total to four, providing a look to suit most people.

Perhaps flatteringly, the users found it almost too easy (from a technical perspective) to create a basic LO, and quickly began asking for more advanced features such as embedded video or interactive tasks. Whilst such things would be possible to add to the LOC tool, there is a tradeoff between the features available and the complication of the tool, both from a usability perspective and the time needed to develop such features. We have also deliberately limited the use of the tool to a specific pedagogical template to reduce the likelihood of users making technical errors. The program supports the use of HTML in any of the entry boxes, so there is the option for the user to add additional code themselves for more advanced features, but this is optional.

There are several additional features identified in the last round of user testing which we intend to add to a final release version of the tool, mostly usability enhancements such as the ability to re-order tasks and activities, adding a ‘New’ option to the file menu and including an option to automatically create a zip file of the web page and style files to upload to a VLE.

## Developing a Support Package

Due to the central role of pedagogy in the design of the LOC Tool, it was felt that the tool should also be accompanied by a number of other components, forming a complete training package to support teachers in the development of effective online learning materials. The full components of the package are:

- The LOC tool
- A Guide to Learning Object Design (pdf)
- A Technical Guide in use of the LOC Tool
- A one day training workshop in use of the LOC tool concluding with creation of first learning object
- An LO planning sheet
- A developer checklist (providing teachers with an LO validation process at post-production stage)

The Guide to Developing Online Learning Materials as Learning Objects is a 10-page document offering teachers advice and guidance on how to design and create their own learning objects. Through a series of practical tips on layout, writing activity instructions, including sufficient feedback to support learning etc. it aims to highlight some of the important differences between designing paper-based teaching materials and designing for an online learning environment, where the created resources might also serve for students’ independent study as well as for blended use by teachers within the classroom. The Technical Guide takes the form of a manual for easy reference to be used after the workshop training. As well as outlining the different operations that the tool is capable of, it also includes a section providing installation instructions for the tool and useful post-development processes such as how to store

LOs designed as more complex collections of associated tasks and resources or assets, and how to upload such learning objects, zipped as content packages, to a VLE.

In previous projects to develop LOs at the University of Southampton, pedagogic developers, often teachers, have worked in close collaboration with a technical team. One role of the latter has been to perform a technical validation of the learning objects. This has involved, for example, checking that the html mark-up is correct for each learning object, that any hyperlinks work, and that the learning object functions appropriately in the published view. For the LOC Tool project, a developer checklist has been created. Its purpose is to support developers in post-production checking of this kind by taking them through a set of questions in relation to a learning object they have created. The benefit of this is that a minimal amount of technical support is required and that potentially full control of the development process can be in the hands of the practitioners themselves. It has also proved useful as a tool for peer evaluation of learning objects during the project workshops.

#### Developer checklist

Name:	Date:	Learning Object Title:	Checked <input checked="" type="checkbox"/>	Comments
Points for checking				
Is the learning object title concise enough/not too long? Does it reflect the content?				
Does the introduction set a micro-context for the learning point without referring outside itself (e.g. to any other learning object, unit or course)?				
Are the learning objectives stated clearly?				

Figure 2: Part of the LO post-production checklist for teacher-developers

### Trialing the LOC Tool

“To be able to work within a proven pedagogically sound structure is invaluable”

“Most of it was easy to use – very intuitive”

(Pilot user comments)

The tool is nearing completion of its pilot phase with a small group of trainee users from a range of institutions and language-related disciplines in the UK. This group was selected from participants attending a two-day workshop which introduced the LOC tool and provided the core training in its use. By the end of the workshop all participants had created their own LO and had given feedback on their experience of using the tool. They were all invited to continue as pilot developers and were funded to develop three further LOs and attend a follow-up workshop to report on progress and to give further feedback. A group of 14 pilot developers was established and each had developed a further LO by the time of the follow-up workshop in November 2007. After each workshop the feedback was evaluated and suggested amendments/developments to the tool were considered and appropriate revisions or additions made.

To date our experience in using the tool has shown that LOC is quick to learn and subsequently easy to use. Some of this is a reflection of its simplicity – it is not overloaded with features and each field provides clear advice on its purpose and function in the LO. The downside of this has been that some users have found it somewhat limiting, in that it does not allow integration of items that they might normally use when creating worksheets and similar paper-based activities, e.g. tables, diagrams etc. However, these can be added as dependent resources (assets) e.g. Word files that can be linked and uploaded from the published LO. For technical reasons (both in the development of the tool and the need for further authoring skills) it was decided not to add this facility. Their key aim is to keep the tool simple and to place the emphasis on the pedagogical purpose of learning objects. There has also been some confusion around the task types offered which are similar to those that might be on offer in other tools that generate exercises with automatic feedback. This is not intended to be a major feature of this tool as the feedback is intended to be formative and to encourage reflection (simple yes/no answers do not really facilitate this). Indeed the importance of feedback that is detailed and for learning has been emphasised in the workshop and accompanying materials.

Many pilot users report that it is time-consuming to create LOs mainly in the planning and development of the learning activity rather than in the use of the tool, although the need to check content thoroughly (links, assets etc.)

also demands a level of attention to detail that is not normally required for face-to-face teaching. Unfortunately use of the checklist, which has been designed to facilitate this, has been limited as has the use of the planning sheet supplied with the tool and this has led to reports of LO editing problems (e.g. needing to re-order activities or re-type questions). There has been a tendency to author directly into the tool, which is easy to do but can lead to extensive editing as teacher reflection on content and purpose of the learning activities may lag behind the input of material in the tool. At the follow-up workshop, the importance of these items was re-emphasised and it was agreed to add some additional functionality to the tool that will facilitate editing. The final version of the tool is due to be released to the pilot group in early January 2008 and the pilot phase will complete in March 2008.

There are plans to continue to disseminate the tool through face-to-face workshops and to develop a repository of LOs to which this growing community of users will contribute LOs for use and re-use by the UK HE community. It is also intended to explore the possibility of providing an editing facility to end users who may wish to adapt the LOs from the repository for their own use.

## Conclusions

Through the design, creation and testing of an appropriate authoring tool for teachers a great deal has been learned about the areas in which teachers need to be supported in order for them to create effective online learning materials. Through the pilot workshops that we have conducted a strong community of practice has emerged and it has been very pleasing for us to see the level of engagement and discussion by workshop participants between, during, and after the training workshops. The experience of this process has reinforced our belief that pedagogic training and support in the development of learning materials for online delivery is a particularly important part of the LOC Tool package.

When the project ends in March 2008 it is anticipated that a number of the project deliverables will be available on a wider scale. The outputs from the LOC Tool use: a bank of 30 or so learning objects in a range of disciplines will have been uploaded to and made freely available through the Subject Centre's Materials Bank; a collection of help resources for teachers embarking on learning object creation in their own subject areas will have been developed; and later in 2008 the first of a series of training workshops will be available for representatives from different institutions to attend at the University of Southampton, or they may be requested by individual institutions for their own teaching staff. The LOC Tool itself will be an open source tool provided that it is being used for educational purposes (commercial use will require a licence fee to be paid) but a fee will be chargeable for the initial training workshop. It is also hoped that the cross-institutional community of practice that has developed as a result of the project will continue to grow and share both their ideas and learning object development with each other.

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