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The Reload Learning Design Tools

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Abstract:

The Reload Learning Design Editor (LDE) is an Open Source, close-to-specification, tree-based Learning Design (LD) editor written in Java using the Eclipse platform. The editor tools are complemented by a LD Player, which provides a familiar and user-friendly interface to the CopperCore LD runtime engine. This paper will describe the history and design rationale underpinning the tools, show how they fit into the LD authoring tools framework devised by Griffiths et al. (2005) and consider their suitability to various user roles and design approaches. The paper will conclude by outlining future versions of the software and how these new developments should facilitate the creation and manipulation of Units of Learning by staff in all user roles.

Keywords: Java, Eclipse, Learning Design.

Interactive Demonstration: The software tools described in this paper (the Reload Learning Design Editor and Reload Learning Design Player, both at version 2.0 as of May 27 2005) are available from the Reload project web site at http://www.reload.ac.uk

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1 Introduction

There is a recognised need for consensus in the design of the processes and tools which underpin eLearning. For example, agreement on how to describe educational resources aids discovery of content, whilst agreement on how that content is organised leads to interoperability between eLearning systems. To date, the Educational Technology community, through IMS[i] and other bodies has developed a number of specifications to promote interoperability and reuse. But these specifications are dense technical documents, intended for a technical audience. Whilst attractive in principle, if the specifications are difficult for the end user to adhere to, they will not be used.

The Reload[ii] project was initially funded to create software to encourage adoption of the IMS Content Packaging[iii] and Metadata[iv] specifications by non expert (largely non technical) users. The software tools created by the project (the Reload Content Package and Metadata (CP&M) Editor and SCORM 1.2 Player) have achieved wide uptake and have become the *de facto* tools for anyone working with the relevant IMS Specifications or the SCORM 1.2[v] Application Profile, providing a convenient visual to support creating and editing of the XML files at the core of these specifications.

This paper describes our development of a set of tools to similarly support the IMS Learning Design specification[vi] and discusses their suitability to expected user roles and their position within the LD tools framework devised by Griffiths et al. (2005). The paper concludes with a discussion of future enhancements to the tools and how these should facilitate the uptake of this specification which is key to describing and sharing teaching practice.

2 History

The LD specification seeks to facilitate the unambiguous description of pedagogical scenarios in such a way that they can be efficiently re-used (Koper and Olivier, 2004). The IMS Learning Design specification was released in Spring 2003, but it was not until early 2005 that tools supporting its uptake started to become available. Although particularly complex, the Learning Design specification is closely related to the Content Package specification, with the <learning design> element attached to the organizations element of the Content Package imsmanifest.xml file.

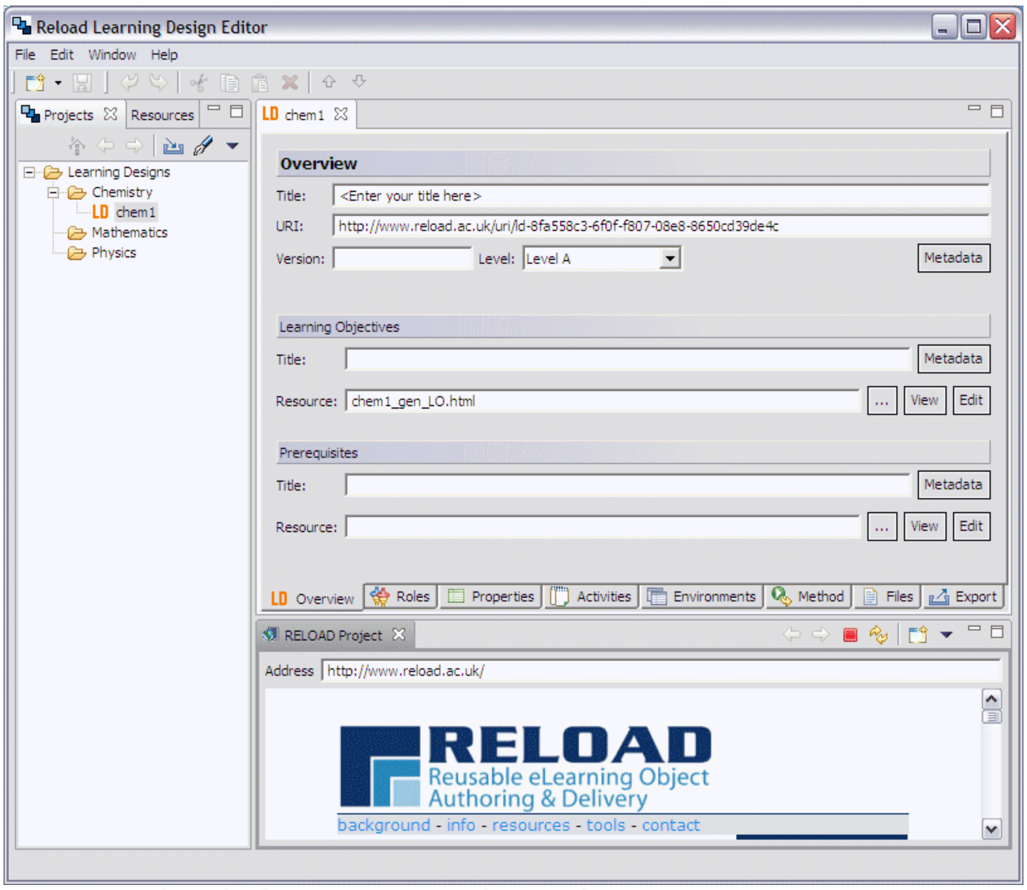
The software architecture used for the Reload CP&M Editor is 'schema driven'; the final xml manifest for the Content Package is created directly by a generic engine using the specification schema as a template to provide the rules of which elements can be added and deleted. In theory, creating an editor for a new specification is simply a matter of writing a new UI suited to the specification and providing the necessary XML Schema files as rules for the editor to follow; the underlying 'engine' is re-used without change. A Level A LD editor, added as extra functionality to the original CP&M Editor, was planned in this way, but it soon became apparent that the complexity of the LD specification (specifically the complexities surrounding resource file dependencies) would make this approach inappropriate for all but the simplest Learning Designs. Indeed for Learning Design as a whole, the user deserves a richer experience than that of editing a complex XML file. As a result we took the decision to move on from the Schema driven approach and adopt a new architecture based on the Eclipse RCP[vii] architecture. In the new version, resource file dependencies are managed separately and the LD imsmanifest.xml is created only for export of the final Unit of Learning.

3 Design Rationale and Tool Summary

The Reload Learning Design Editor and Player complement each other to provide an environment for creating and previewing units of Learning. At present, they are implemented as separate tools and are treated as such below.

3.1 The Reload Learning Design Editor

The Reload LDE is a tree based editor, providing a series of forms for completion, based on a structure closely resembling the data model in the IMS LD specification. The user starts off with an empty Learning Design and adds the relevant elements (along with values) as required. The tools structure the Learning Design by only allowing valid structures (for instance, only allowing Roles to be added in the relevant section). Where an element has a restricted vocabulary, the choices are limited through the use of drop down menus'. The LDE workspace is shown in Figure 1 below.


Reload Learning Design Editor
File Edit Window Help
Projects
Resources
Learning Designs
Chemistry
chem1
Mathematics
Physics
Overview
Learning Objectives
Prerequisites
Metadata
View
Edit
Overview Roles Properties Activities Environments Method Files Export
RELOAD Project
RELOAD
Reusable eLearning Object Authoring & Delivery
background - info - resources - tools - contact

Title: <Enter your title here>
URI: http://www.reload.ac.uk/uri/ld-8fa558c3-6f0f-f807-08e8-8650cd39de4c
Version:
Level: Level A
Resource: chem1_gen_LO.html
Address: http://www.reload.ac.uk/

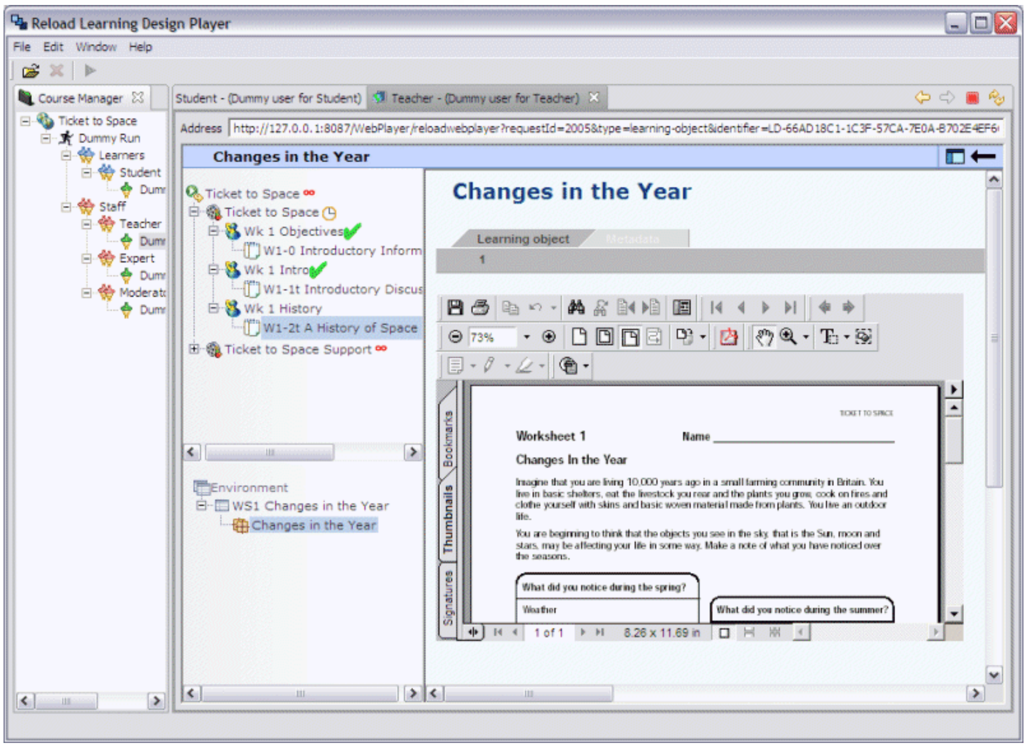
Figure 1: The Reload Learning Design Editor Workspace

The main panel of the Reload LDE consists of eight tabs, the first six of which allow editing of the Learning Design itself (Overview, Roles, Properties, Activities, Environments, and Method). In addition, a Files tab allows management of the resources utilised by the Learning Design and the Export tab is used for saving and exporting a Unit of Learning for use elsewhere. A preview pane allows resources utilised (web pages, word documents, text files) to be previewed and text editor capability allows some resources to be created and edited inline. The inclusion of simple editing and preview tools means that the whole design process for the Learning Design can be conducted from within the software, whilst external editors can also be specified to edit specific content file types. The process of creating a Learning Design is dependent on the starting material. It may be that a course already exists with a well-defined structure and pre-existing materials – in which case the process of creating a Learning Design primarily entails linking the resources together at the right time and with the right user roles. It is also possible to create a Learning Design with no pre-existing materials. In this case, resources (or at least placeholders for resources) can be created in parallel as the Learning Design is specified. As it is expected that most users will work on a number of Learning Designs in parallel, a Projects tab acts as a virtual organiser for all the Learning Designs created with the Reload LDE. The project nature of the tools also means that several related Learning Designs can be created in the same project folder, sharing their content files.

Typically, a user will work through the 6 LD tabs, first specifying general details about the Learning Design, then creating Roles, adding Activities and linking these to Environments. If the Learning Design is to include Level B elements, then the Properties tab is used. All elements of the Learning Design are integrated in the Method tab, where Conditions (for Level B Designs) and Notifications (for Level C Designs) can be added. Once all elements of the design have been added, the user chooses the Export tab, where they can perform simple checks on the integrity of the Learning Design before exporting a zipped Unit of Learning for viewing in the Reload LD Player. Creating a Learning Design is likely to be an iterative process, with a degree of re-design necessary at this stage. The same export tab is then used to prepare a UoL for delivery or storage in a repository.

3.2 The Reload Learning Design Player

When a Unit of Learning is created in the Reload LDE or retrieved from a repository, it is important that it can be 'previewed' easily. The Reload Learning Design Player (LDP) provides a simple graphical user interface for the CopperCore[viii] LD runtime engine (Martens and Vogten, 2005). The Player is simple to use; when the Unit of Learning is imported into the player, dummy users are automatically set up for each role defined in the LD. Any role can be 'played' by selecting that user from the list and clicking the play icon. All roles are loaded up as tabs in the browser pane. In this way, the user can view the behaviour of the Unit of Learning for each role simultaneously. Figure 2 below shows a typical view of the Player in use.



TICKET TO SPACE

Worksheet 1 Name ____________

Changes In the Year

Imagine that you are living 10,000 years ago in a small farming community in Britain. You live in basic shelters, eat the livestock you rear and the plants you grow, cook on fires and clothe yourself with skins and basic woven material made from plants. You live an outdoor life.

You are beginning to think that the objects you see in the sky, that is the Sun, moon and stars, may be affecting your life in some way. Make a note of what you have noticed over the seasons.

What did you notice during the spring?

Weather

What did you notice during the summer?

Figure 2: The Reload LDP showing the teacher role view for a Unit of Learning.

4 Reload Tools and expected User Roles

Griffiths et al (2005) described five typical user roles for specialised Learning Design tools and discussed the type of tools which they would need to fulfil their role. The user roles identified range from learners and teachers through to tool developers. Table 1 below summarises the utility of the current Reload tools with respect to the five user roles identified.

USER ROLE	RELEVANCE OF RELOAD TOOLS
1. Learners and teachers participating in educational activities	**LOW:** These users need a fully featured runtime environment but would not wish to edit Learning Designs or view UoLs outside the delivery environment.
2. Staff who set up UoLs to be run with learners	

3. Adaptors and Assemblers of UoLs	**MEDIUM:** Adaptors require a robust and fully featured editor to allow them to edit elements of an existing Learning Design. Assemblers needs are more specialised. They may work with editors which interface directly with repositories of LD fragments, but will need to be able to edit a significant subset of LD elements to tailor designs to individual needs.
4. Designers of UoLs	**HIGH:** UoL Designers require a fully featured Learning Design Editor which must provide edit access for every element (Level A, B, and C) of a Learning Design. Designers may also benefit from integrated tools to edit and create content.
5. Developers of Tools for LD	**MEDIUM:** Require a benchmark system, which is faithful to the Learning Design specification and convenient to use.

Table 1: Reload and the five user roles identified by Griffiths et al (2005)

The Reload Tools are aimed primarily at UoL Designers, but would be also be suitable for use by Adaptors and Assemblers of Units of Learning. Indeed, at present, in the absence of tools which are more specialised, tools such as the Reload LDE provide the most efficient way to adapt pre-existing Units of Learning. As the tools adhere closely to the IMS LD specification, they may be of particular use as a benchmark to developers of other LD tools.

5 The Reload LDE and the LD tools framework.

Griffiths et al (2005) devised a framework for Learning Design tools based on a survey of existing tools and their analysis of the different needs of the different user roles. Their framework identifies two key dimensions: the specificity of tools (general purpose or suited to a specific task), and how closely they follow the specification (are they designed for use in conjunction with the specification, or in a more general sense, as tools to assist in the design of learning). Tools can be categorised according to these two criteria and associated with the needs of specific user roles.

The framework can be represented graphically, as in Figure 3 below. Griffiths et al classified the original Reload LDE in the lower left quadrant, as a general purpose tool which kept close to the IMS LD specification. The second version of the Reload LDE fits in largely the same place as the original version, indeed the first generation of LD tools mainly fit in this quadrant, as they were developed primarily for developers and early adopters to explore and think about the implications of the specification for creating Learning Designs.

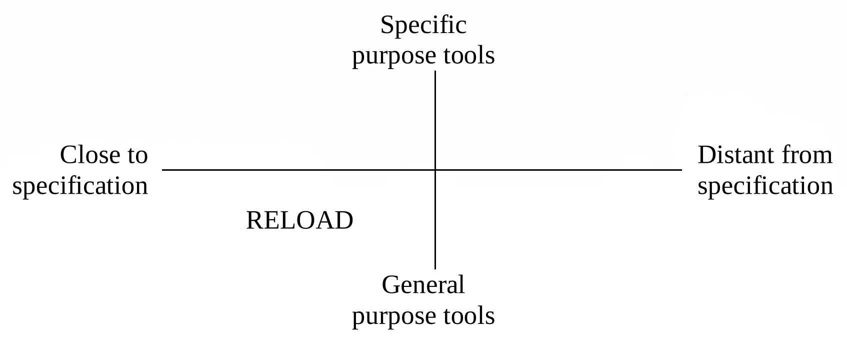


Figure 3: Two dimensions of LD Tool Design (after Griffiths et al, 2005)

In user terms, the vertical axis separates those with a technical background (left half) from those who are primarily educators. The horizontal axis separates those who create Learning Designs or designing learning (bottom half) from those who adapt them (top half). As LD tools start to evolve, we will see specialised versions of the initial tools appearing as constrained LD editors in the upper left quadrant. As more LDs are created, and Learning Designs and fragments of Learning Designs become available (through repositories) we will see tools appearing in the upper right quadrant that facilitate adapting and assembling new LDs based on pre-existing Designs or building blocks. Finally, as we begin to see the benefit of the LD specification in providing a common language for discussing teaching practice, we will start to see very specialised tools aimed at educators which no longer use the terms of the LD specification, but provide terms and structures which are more relevant to the educator community.

6 The Future of the Reload LD tools

The Open Source MIT[ix] License under which all the Reload software has been developed encourages others to adapt and build on the code created by Reload. For the CP&M Editor, this has resulted in the development of new tools such as the Reload SCORM 2004 Editor[x]. The Reload LD tools could be adapted in similar ways.

The RELOAD LDE exposes all of the LD elements at levels A, B and C. Very little is hidden from the user. Given that we are now in a position to clearly see what is mandatory or optional and how the components inter-relate, we can now propose possible ways forward to modify the user interface to provide for the differing expected user roles outlined above by Griffiths et al.

One such proposal is to provide a graphical layer on top of the Reload LD 'engine' that could enable different user entry points for different work flows. We have already provided a simple case in the Reload LDE by the use of Eclipse's 'Cheat Sheets'. These are like software wizards that guide the user through a particular process. The one provided is designed to 'Create a new Learning Design'. Further use cases might be to allow the user to create a Play with a number of Acts, or populate an Act with Roles. This could be implemented as a high level GUI with graphical renditions of each component inter-relating by means of elements similar to those found in some UML editing tools. The necessary fields and attributes for each component could be edited by selecting a component and opening a 'Properties' View in the editor. This single, context sensitive, Properties View could be shown or hidden as required. Additionally, building on top of the existing LDE's 'Checklist' function, the user could be alerted to those fields that are mandatory or warned of incorrect references to other LD elements.

Another proposal is to allow the user to create parts of the UoL that could be saved as fragments of XML that could be re-used in a full UoL – an Environment for example. Thus the user could build up a personal repertoire of sections of Units of Learning that could be ultimately pieced together to create a full UoL. However, this may prove to be problematic if there are many dependencies on other components such as resources or roles.

Dispensing with the Java “Swing” interface and adopting the Eclipse RCP framework has opened up possibilities that we or others could leverage to provide a much richer user experience than already exists. This includes not just graphical frameworks but underlying model frameworks such as plug-in extensibility, ftp, webdav, file sharing or an interface to a repository of Learning Designs.

Ultimately, the Learning Design specification is exceedingly complex and working with the specification means providing values for attributes, so there will always be a need for 'close to specification' Editors such as Reload LDE which stay close to the specification and are not specialised to a specific task. The aim of the Reload tools is to make it easy to utilise the specification, and the Open Source nature of the tools makes them an ideal building block for other work to create the next generation tools.

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8 Footnotes

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