Implementing Learning Design: A Decade of Lessons Learned

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This paper offers reflections on developments in the field of Learning Design from 2003-2013. It considers evolving conceptual issues, technology developments and communities of practice, and concludes with reflections on the future. Areas considered include: the conceptual challenge of aligning the pedagogical metamodel of Learning Design with principles for effective teaching and learning; the impact of the wider educational landscape on Learning Design, particularly developments in Curriculum Design; whether learning really can be "designed"; technology developments and challenges, and sharing among different kinds of Learning Design communities. The paper draws on past and current research in Learning Design, particularly the recent Larnaca Declaration on Learning Design.

Keywords: Learning Design, e-learning, Curriculum Design, sharing, LAMS, Pedagogic Planners, open educational resources

Background

At the 2003 ASCILITE conference, the paper "Implementing Learning Design: The Learning Activity Management System (LAMS)" (Dalziel, 2003) provided a brief overview of the new field of Learning Design, and discussed the development of a Learning Design system (LAMS), and this paper has subsequently become the main paper cited about LAMS (316 citations in Google Scholar as at June 2013). In the decade since this paper, the field of Learning Design has evolved in terms of its conceptual frameworks, its technologies, and its communities of practice, and LAMS and associated work has contributed to this evolution. Given the "Learning from the Past, Understanding our Present and Imagining the Future" themes of ASCILITE 2013, this paper reflects on a decade of developments in the wider field of Learning Design, including reflections on the contributions of LAMS. This paper does not seek to be a comprehensive review of developments in the field of Learning Design or the LAMS software, but rather a review of key themes over the past decade from the perspective of the author. One goal of this paper is to reflect on issues that have been actively discussed in conferences, workshops and other "ephemeral" communications that have not always received equivalent discussion in the written literature.

Before discussing developments in the field, an overview of Learning Design and the 2003 paper will provide a basis for further reflections. While there are many definitions of Learning Design (see Dobozy, 2013 for a review), and issues with the definition of the field are relevant to the reflections offered below, Learning Design can initially be described as the creation, sharing and implementation of sequences of teaching and learning activities that include both content and collaboration. The field covers ways of representing these sequences, communities for sharing them, and software for implementation of learning designs with students, covering both online and face to face contexts. It is important to note that "sequences" should be interpreted broadly to mean any set of activities for students that take place over time, rather than only simple linear sequences of activities. Learning Design also includes principles and processes for advising educators on designing effective teaching

and learning experiences for students.

At the time of the 2003 paper, the new field of Learning Design was in part a reaction against other "content centric" views of e-learning (eg, "Learning Objects") that often only catered for single-learner online experiences. Since this time, collaborative learning has become a major trend in e-learning through the wider use of collaborative learning tools (especially in Learning Management Systems – LMSs), and the rise of social media and Web 2.0 approaches. Hence, the original "quarrel" between Learning Design and courseware styles of e-learning looks quite different a decade later – although perhaps not primarily due to the impact of Learning Design itself.

In terms of LAMS, the software has continued to evolve over the past decade, including its release as open source software in 2005, and a complete development of the software architecture in 2006-2007 (LAMS Version 2). Among the new features made possible by this redevelopment was the potential for different languages, and there are now 33 different translations of LAMS maintained by a community of over 110 translators. As at the 30th of April 2013, the LAMS Community website had 8,726 members and a repository of 1,584 freely shared LAMS learning designs which had been downloaded/previewed over 50,000 times (Dalziel, 2013). The LAMS software has incorporated new activity tools, features and refinements, but is still fundamentally similar to the description given in the 2003 article, including the importance of the visual authoring environment – this is illustrated by the role play sequence shown in Figure 1, which includes use of the V2 "branching" feature (for further details on this role play, see Dalziel, 2010). Figure 1 is useful not just as an illustration of the LAMS software, but as an example of the focus on visualisation of teaching and learning activities ("a learning design") in the field of Learning Design (in this paper the capitalised phrase "Learning Design" refers to the field as a whole, while the uncapitalised phrase "a learning design" refers to a particular instance).
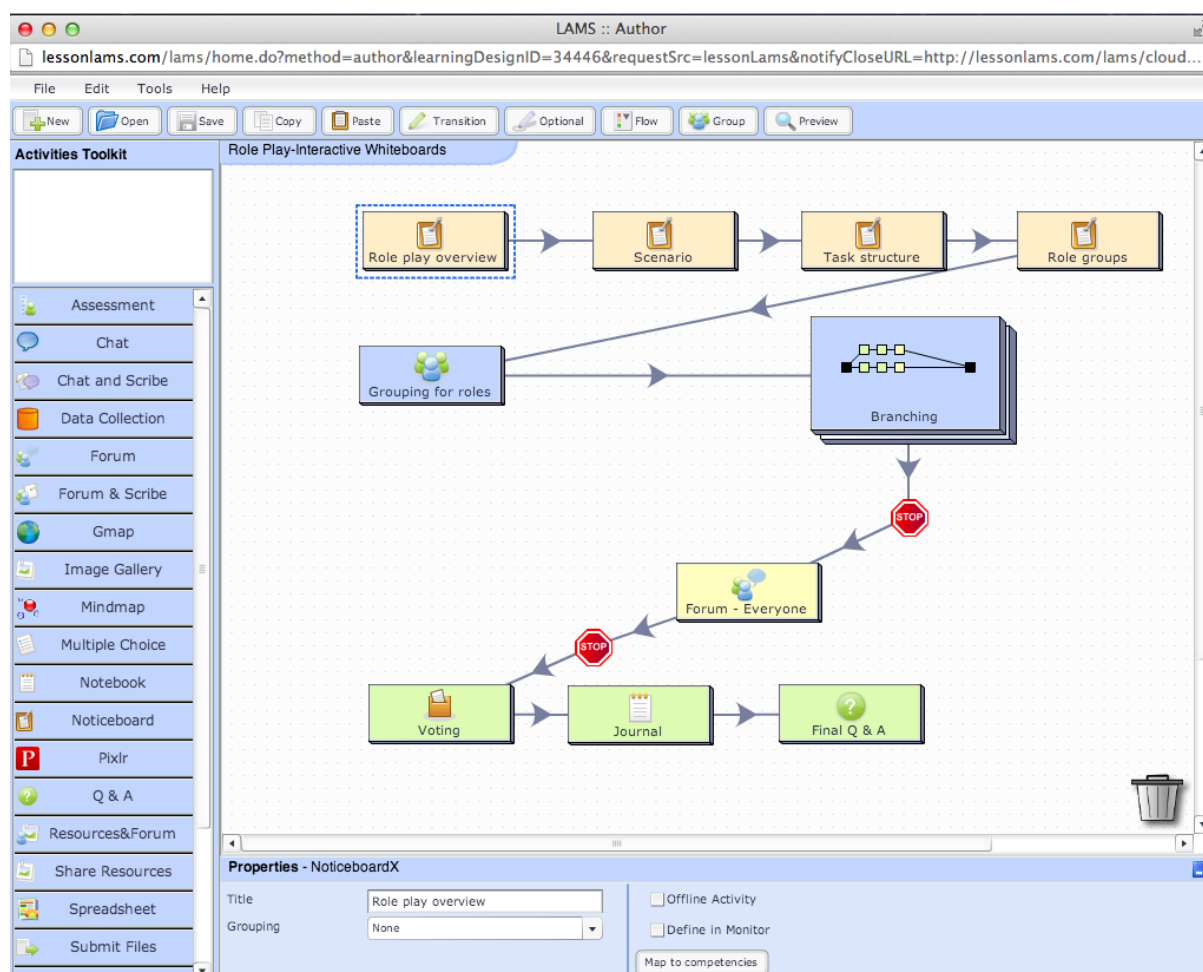

Figure 1: Example of role play sequence shown in LAMS V2.4 Authoring environment, illustrating a sequence of activity tools (taken from Toolkit on the left) and arranged into a format suitable for a role play based on two role groups ("pro" and "con").

This rest of this paper will examine three areas of past and current work in Learning Design: reflections on the evolving conceptual framework for Learning Design as a field of research (including four sub-topics); developments in technologies for Learning Design; and progress in sharing of learning designs, including online communities of practice and sharing of Learning Design research. The paper will conclude with reflections on future opportunities and challenges for Learning Design.

Conceptual Developments in Learning Design

While the phrase "learning design" has been used in various contexts for many years, the Larnaca Declaration on Learning Design (2012 – this document is discussed further below) notes that the field of Learning Design arose primarily from four parallel and partly connected bodies of research and development in the late 1990s and early 2000s – two in Europe and two in Australia:

- The foundational research on Educational Modeling Language (EML) by Rob Koper at the Open University of the Netherlands (Koper, 2001). The subsequent development of the IMS Learning Design technical specification (IMS GLC, 2003) relied heavily on EML, as well as Bill Olivier's research on e-learning specifications and the "Colloquia" software.
- The SoURCE project and related research in the UK (eg, Laurillard & McAndrew, 2002), led by researchers such as Diana Laurillard, Grainne Connole, Helen Beetham and many others.
- The Australian Universities Teaching Committee (AUTC) Learning Design project, based at Wollongong University (see http://www.learningdesigns.uow.edu.au/)
- The development and implementation of LAMS (see www.lamsfoundation.org) and the associated LAMS Community (see www.lamscommunity.org).

As the field evolved to incorporate a much wider range of researchers, projects and systems (eg, see the "Timeline" from the Larnaca Declaration for examples), there have been different streams of thought and emphases within the field of Learning Design over the past decade. One cluster has focused on creating a technical language for describing teaching and learning activities and implementing these descriptions in software, while another cluster has placed greater relative emphasis on describing and sharing effective pedagogical methods. It is interesting to note that both of these streams of thought about Learning Design were present in the four early projects, but with considerable differences in emphasis – EML, IMS LD and LAMS focused more on the technical side, whereas SoURCE (and subsequent UK projects) and AUTC Learning Design focused more on sharing effective pedagogical methods.

As the field of Learning Design has a very broad focus (Larnaca Declaration, 2012), it is not surprising that different projects have investigated different subparts of the wider challenge. However, in the early years of Learning Design research, there was considerable debate among some researchers on the "right" perspective on Learning Design (eg, that IMS Learning Design was the only valid interpretation of the concept of Learning Design, see Britain, 2004), whereas with hindsight it appears analogous to the parable of the six blind men who touch different parts of an elephant, and so describe the elephant in different ways according to the part they touched (without recognising the whole elephant encompasses each description). One of the key developments in the field in recent years is that the "whole elephant of Learning Design" is becoming clearer. The following section reflects on four particular conceptual issues that have been debated over the past decade.

1. Pedagogical metamodel versus principles for effective teaching and learning

A challenging conceptual difference within the field arises from the concept of Learning Design as a descriptive framework for a "pedagogical metamodel" (Koper, 2001) which aspires to be "pedagogically neutral"; as compared with approaches which explicitly define principles for effective pedagogy as the basis for selecting and describing Learning Design (e,g AUTC Learning Design project – see Boud & Prosser, 2002). This issue has emerged in many ways across different Learning Design projects and research depending on the emphasis of the researchers. Is it more important to work towards a descriptive framework that can describe many different pedagogical approaches (but without any particular commitment to one approach); or is it more important to focus on principles that describe effective teaching and learning approaches (especially those that are student-centric) and to promulgate these widely to enhance education?

Following several years of debate among various Learning Design researchers, a group of experts worked together on this challenge (among others) in 2011 and 2012 leading to a new synthesis of ideas known as the "Larnaca Declaration on Learning Design" (Larnaca Declaration, 2012) – taking its name from the city of a

significant meeting of this group. In the Larnaca Declaration, both dimensions of Learning Design are identified as important, but for different purposes. An analogy with music notation is used to explain the relationship between them – music notation provides an agreed descriptive framework for musicians to convey musical ideas to each other over time and space. In itself, musical notation aspires to be "neutral" about the music it conveys – beautiful music and mediocre music can be equally conveyed using the same descriptive framework. In this sense, the attempts at developing a descriptive framework for many different types of teaching and learning activities are analogous to the development of systems of music notation (be they Western music notation or other traditions). It is also worth noting that music notation does not capture everything about a musical performance – there is still an important role for interpretation – but it captures enough information to convey a musical idea from one person to another.

However, few musicians are interested in music notation purely for the abstract challenge of representing music on paper – they use music notation to try to convey beautiful music. And it is worth noting that the art and science of creating beautiful music (as opposed to mediocre music) is different from the structure of the representational system for writing down music. However, many composers benefit by studying the work of other musicians (conveyed via musical notation), so the two dimensions are not unrelated – they just focus on different aspects of the overall challenge.

In the Larnaca Declaration, the core challenge of a representational framework for educational activities is called the Learning Design Framework (LD-F) – which encompasses visualisation/representation as well as guidance for educators and sharing of designs; whereas the practical challenge of creating effective teaching and learning experiences for students is called Learning Design Practice (LD-P). While the Larnaca Declaration gives numerous examples of "early attempts" at representational frameworks for education (such as LAMS sequences, AUTC flow diagrams, educational patterns, etc) it recognises that education, as a field, has not yet developed any system of notation that has the expressive power or broad adoption of music notation.

Compared to a decade ago, there is now a better sense of how to synthesise these key ideas, and a path for developing more comprehensive and useful frameworks for describing teaching and learning activities. It is recognised that more than one framework may be needed, and that the goal of a grand, unified framework for educational activities may yet fail, but if it does fail, there is a hope that even the failure will offer valuable lessons about the potential, and limits, for describing and conveying educational ideas among educators (Larnaca Declaration 2012).

2. The wider educational landscape for Learning Design

A second challenging issue over the past decade has been the question of how and where to locate Learning Design analysis within the broader world of education practice. That is, most specific learning design examples tend to operate at a level of granularity of approximately one lesson's worth of activities, or around one week's worth of asynchronous online activities – with variations ranging from a few minutes for a very short learning design, up to several classes or weeks for longer learning designs). This level of analysis is quite different to the more traditional level of "course" or "curriculum" design, which typically describes the structure of content and activities over a longer period, such as a whole term or semester or year of work (depending on the educational context).

This recognition of different levels of granularity of design is only one small part of the wider educational landscape, there are many other issues that impact on Learning Design, such as educational philosophies, research methodologies and the characteristics of educational institutions, teachers and students. All of these factors affect the way that educators go about designing, teaching and reflecting on teaching experiences. This "teaching lifecycle" is the key point of contact with the core concepts of Learning Design, and the outcomes of this process can then be investigated from the student's point of view in the form of their responses to teaching, assessments, evaluations, etc. While there are many other issues that could also be considered, the Larnaca Declaration offers a synthesis of this wider landscape and its relationship to core Learning Design concepts in the "Learning Design Conceptual Map" (LD-CM) – provided in Figure 2. While this is a relatively new addition to the field, it is hoped that it might provide a lens for organising discussion of wider factors that impinge on Learning Design Practice. The Larnaca Declaration concludes with a simple summary of how the three elements of Learning Design Frameworks, Learning Design Practice and the Learning Design Conceptual Map make up the field as a whole – see Figure 3.

3. Can learning be designed?

A third challenging issue for the field arises from its very name "Learning Design" and whether it makes sense to talk about "designing" learning. There are two different aspects of this discussion. First, some researchers in workshop discussions have wondered whether the field would be better called "Teaching Design", as so much of the focus is on how educators make decisions about structuring activities for learners. This issue has proved a two-edged sword: on the one hand, it is a reasonable observation to make about the focus of many practical aspects of the field; on the other hand, the kind of pedagogical approaches often associated with Learning Design Practice are student-centric and opposed to excessive use of narrow "instructivist" modes of education, and so the emphasis on the word "Learning" in the title of the field, rather than "Teaching" is seen as an important signifier of the broader pedagogical leanings of those parts of the field that address principles of effective learning.

Challenge
Creating learning experiences aligned to particular pedagogical approaches and learning objectives

Educational Philosophy	Teaching Lifecycle	Level of Granularity
All pedagogical approaches	Preparation	Program
Theories & Methodologies	Teaching	Module
A range based on assumptions about the Learning Environment	Post-teaching reflection	Learning Activities
Learning Environment: Characteristics & Values	Professional Development	Tasks
Institution Educator Learner		

Core Concepts
Guidance   Representation/   Sharing Visualisation

Implementation
Tools   Resources

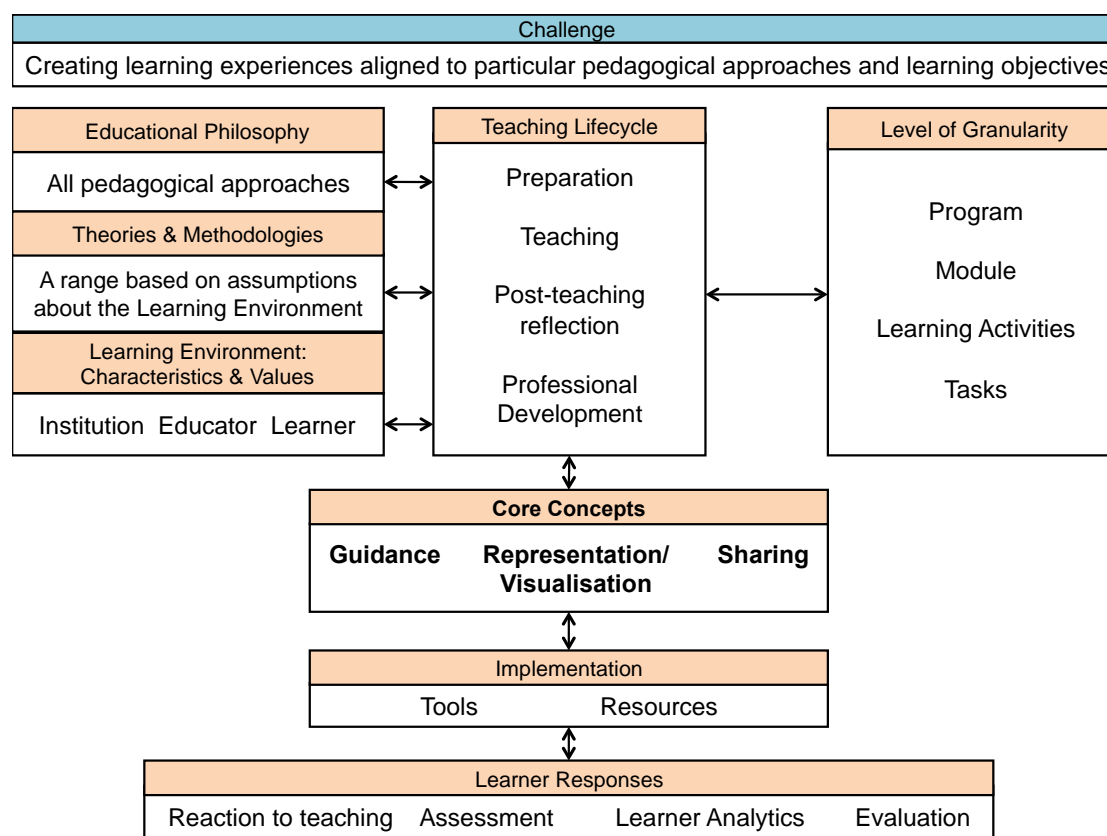| Learner Responses |
| --- |
| Reaction to teaching   Assessment   Learner Analytics   Evaluation |

Figure 2: The Learning Design Conceptual Map (LD-CM) from the Larnaca Declaration, illustrating connections between core Learning Design concepts (middle) and teacher planning activities (above) and implementation activities (below)
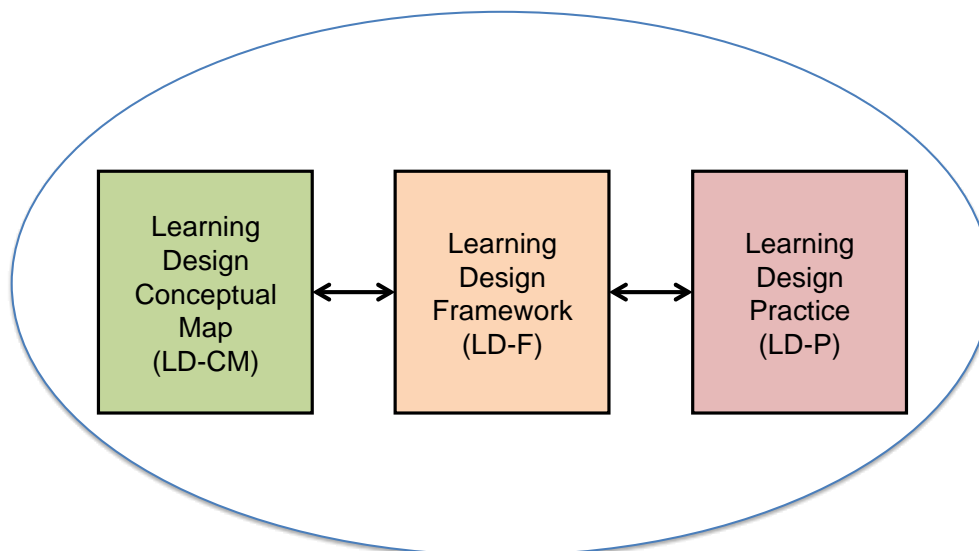
Figure 3: The components of the field of Learning Design as presented in the Larnaca Declaration

It will be interesting to see how the future views this issue – there may come a time where educators can talk about the design of teaching activities that have a strong student-centric focus without feeling the need to resile from a phrase like "Teaching Design" – but the author's experience is that this is yet to occur, so the name "Learning Design" continues to contain an important embedded signifier of certain pedagogical leanings within much of the field.

A second complex conceptual issue lies beneath this terminological debate. In recent years Peter Goodyear as been at pains to point out that learning is the internal experience of students, and so it doesn't really make sense for teachers to talk about designing learning, because this experience is out of their reach (eg, Goodyear & Retalis, 2010). All that a teacher can do is create a context in which certain types of learning might be encouraged, but actual learning is ultimately up to the response of the learner. Arising from this observation is a need to look more broadly at learning designs that are student-led and controlled, and to think about the role of educators in co-designing learning activities with students. This is an important critique of many current ideas in the field, and further research is needed to explore its implications in the future. This issue may yet prove to be a fundamental problem for the music notation analogy of Learning Design, as it asks the question of who is the "performer" of educational notation – the teacher or the student?

4. From Learning Design to Curriculum Design

A final conceptual issue to note from the past decade has been a shift of emphasis from "small scale" Learning Design (ie, a class or a week) to wider Curriculum Design issues (ie, a whole unit or course). As the relative emphasis given to technical issues in Learning Design began to subside after the early years of the decade (for further discussion, see below), there was an increasing recognition in the field that decisions made at the level of a single learning design were often powerfully affected by wider course design issues, and so both the Learning Design and Curriculum Design "levels of granularity" need to be considered together. This broadening of focus was most obvious in the UK, where a major JISC funding program on Learning Design (http://www.jisc.ac.uk/whatwedo/programmes/elearningpedagogy/designlearn.aspx) was followed by a major funding program on Curriculum Design – largely as a result of feedback on the earlier project (http://www.jisc.ac.uk/whatwedo/programmes/elearning/curriculumdesign.aspx).

Part of the earlier JISC program was support for the development of two "Pedagogic Planners" – Phoebe

(Masterman & Manton, 2011) and the London Planner – and this research was subsequently extended by a major research grant to Diana Laurillard and colleagues (Laurillard et al, 2013) for the "Learning Design Support Environment" (see https://sites.google.com/a/lkl.ac.uk/ldse/) – later renamed the "Learning Designer". These projects, and similar LAMS research ("LAMS Activity Planner" – see the Templates area of www.lessonlams.com) examined ways to provide advice and guidance to educators on creating, choosing and/or editing learning designs to support curriculum goals. At the current time, the Learning Designer has the broadest focus, with guidance for design at both Curriculum Design and Learning Design levels, and it will be a key project to observe into the future in terms of potential further development and practical experiences from uptake by educators.

Technical Developments in Learning Design

While the core concepts of Learning Design can be applied in face to face educational settings without the use of computers, the origins of Learning Design had a strong technical focus. The emergence of Educational Modeling Language, and its subsequent adaptation for the IMS Learning Design specification, was for many early (technical) researchers the "essence" of Learning Design. Related to this was the attempt of the "Valkenburg group" to collaboratively develop a software system based on these ideas (Koper & Tattersall, 2005).

In practice, Learning Design software has proved much more challenging to develop than most researchers anticipated. The field has seen a significant number of prototype systems, but few have moved beyond this stage of development to wider use. From an IMS LD perspective, the main effort was the "Coppercore" engine (see www.coppercore.org), complemented by the ReLoad authoring environment, and the incorporation of activity tools via software such as the SLeD player. Other approaches adapted existing e-learning systems to some or all of the requirements of IMS LD (eg, Grail; MOT+).

One of the core challenges for development and implementation arose from the complexity of the underlying model of IMS LD – in particular, its requirements for (separately) describing roles, activities and environments for each step in a sequence. For educators, it was difficult to apply these concepts to typical teaching contexts without considerable prior training in the complex structure of IMS LD; for software developers, it required a very high degree of flexibility across many different interconnected software components, and this proved challenging to unify into a stable and ease to use system.

Part of the reason for the adoption of LAMS by educators was its alternative approach to these challenges. The development of LAMS was based on a deliberate simplification of the concepts behind the IMS LD model – the focus was primarily on two roles (teacher and student) that were "hardwired" into the overall system architecture (although some student sub-roles did exist, such as the discussant and recorder roles in the "Chat & Scribe" tool). Authoring was based on the sequencing of activity tools (ie, forum, chat, quiz, etc) where these tools represented a "pre-configured" combination of the activity and environment components of the IMS LD model. These tools had their own internal settings (eg, students answers to the "Q&A" tool could be anonymous or named); but the pre-configured activity tool provided a limit on the amount of flexibility contained within each tool.

This limit to flexibility helped software development (by constraining the size of the overall development challenge) and also helped educator understanding (by dividing up the features of the software into tool-sized "chunks"). Combined with a visual, drag and drop authoring environment, this approach proved more easily understood and adopted by educators (although not without a steep learning curve of its own – Masterman & Lee, 2005). Other more recent Learning Design software development has followed a similar "tool chunking" approach (eg, the METIS project).

Looking back after a decade, one of the technology surprises is that Learning Design functionality has not been integrated into the core of Learning Management Systems. While there are integrations of Learning Design systems with various LMSs that allow the two systems to work together, the core technical features of an authoring system and a "workflow engine" for managing the flow of students through a sequence of activities is yet to be added to LMSs. However, some "LD like" features have begun to appear in recent years, particularly the use of "conditional" activities, where a student must complete a certain activity in a LMS course area before the next activity is revealed (including potential requirements for progression such as achieving a minimum quiz score); and the related feature of "hiding" certain activities in a course area which are later revealed by the teacher according to a "LD like" plan of activities (NB: some LMSs have supported "hiding" throughout the past decade). One difficulty with these approaches is that the plan of activities is rarely extractable in a way that

it could be easily shared with other educators (as implemented in learning design repositories in online communities of practice – see below).

There are various possible reasons for this lack of Learning Design functionality in LMSs to date. As noted above, the technical requirements for development are significant, and so the combination of only modest educator demand for Learning Design features coupled with heavy development requirements may have made this area "lower down the list of priorities" for some LMS developers. As a decision maker once said to the author "[Learning Design] is a pedagogical 'nice to have', but I doubt the people who pay our licensing fees will pay money for that".

A different explanation is that Learning Design is most useful when it incorporates relevant discipline content – "generic pedagogical templates" for Learning Design (eg, Dalziel, 2010) are theoretically interesting, but of little actual value to busy educators who need "ready to use" lessons – which means learning designs which incorporate discipline content. From this perspective, there may be significant opportunities for Learning Design to collaborate with textbook publishers in the future, given their very large collections of content, combined with pressures on their traditional print-based business model.

Looking back, the technical side of Learning Design has become relatively less of the overall field in recent years – not necessarily due to a decline in the amount of technical research, but certainly due to the relative explosion of less-technically oriented work on Learning Design such as sharing among educators (see below) and the provision of advice and guidance (as exemplified by the JISC Curriculum Design projects such as Viewpoints and OULDI – see Conole, 2013).

Despite various calls for changes to IMS LD since 2003 (eg, Dalziel, 2006), no changes have been made to the specification since its introduction, and it is the author's opinion that the relative importance given to technical interoperability of machine-readable learning designs has diminished as other areas of the field have flourished. However, it is possible that if Learning Design achieves wider adoption in the future, the technical interoperability questions may arise once again.

Learning Design Sharing and Communities of Practice

While conceptual and technical issues in Learning Design often provoke considerable debate (given their complexity), the concept of sharing remains a crucial part of the field – indeed, it can be argued to be one of the most important distinguishing elements of Learning Design (Conole, 2013). Drawing on the music notation analogy again, it is idea of conveying effective teaching and learning ideas from one educator to another (like sharing written music) that provides the motive force for the field. This sharing has typically been done using open education approaches, such as the use of Creative Commons licenses for shared sequences, and so learning designs can be seen as a type of open educational resource.

Some of the earliest online communities for Learning Design were focused on the technical challenges of development, particularly the "Unfold" community (Burgos & Griffiths, 2005). But parallel to the technically-oriented groups were other groups that gave relatively more emphasis to pedagogical issues, such as those facilitated by the CETIS Pedagogy and Education Content special interest groups. One of the early online communities for both technical and pedagogical discussions was the LAMS Community (www.lamscommunity.org), which provided an online community for technical discussion of the LAMS software, but also forums for educators and a repository for sharing of LAMS learning design sequences. Over time the repository has become the largest collection of community shared designs (1,584 as at April 2013) and the technical forums have remained active for discussion of LAMS development, but the educational forums have been more patchy in their discussions, with limited use in recent years.

A recent active online community for discussion of Learning Design among educators has been the "Cloudworks" site, which combines a Web 2.0 style of interface with features for fostering discussion and debate about Learning Design and related e-learning issues (Conole & Culver, 2010). In particular, Cloudworks has proved useful as a tool for collating materials and discussion for workshops and conferences – frequently in real time! Apart from the useful Web 2.0 features of Cloudworks, it has also had success in building and sustaining a community of educators (primarily in Europe) who use the site for ongoing discussion.

Looking to the future, one of the key challenges for Learning Design communities (and other e-learning communities) is how best to create and sustain an online environment that educators wish to contribute to on a regular basis. Despite the desirability of such a site, and some limited success in certain areas (such as

Cloudworks), it remains a wider challenge for the field of e-learning to build large, sustainable, active communities for discussion and sharing among educators. It seems that the main challenge here is not just the functionality and features of a site, but the community dynamics that lead to growing, active engagement. It is likely that differences in approaches to sharing between disciplines is a related factor.

Apart from online communities of practice, there have been a number of other contexts for sharing ideas and research about Learning Design. There have been a number of conferences and workshops, including several "pedagogic planner" meetings and CETIS DesignBashes (eg, see http://jiscdesignstudio.pbworks.com/w/page/45497380/CETIS%20Design%20Bash%202011), the 12 LAMS and Learning Design Conferences (7 in Australia, 4 in Europe and 1 in Asia – see www.lamfoundation.org/conferences), the various TENCompetence conferences (see http://tencompetence-project.bolton.ac.uk/), the AUTC Learning Design project conference (www.learningdesigns.uow.edu.au/ , the Learning Design Grid workshops (www.ld-grid.org/) and many other conferences, workshops and meetings.

There have also been a number of significant publications, such as "Learning Design: A Handbook on Modelling and Delivering Networked Education and Training" (Koper & Tattersall, 2005); "Rethinking Pedagogy" (Beetham & Sharpe, 2007 & 2013); "Handbook of Learning Design" (Lockyer, Bennett, Agostino & Harper, 2009); "Teaching as a Design Science" (Laurillard, 2012) and "Designing for Learning in an Open World" (Conole, 2013). There are also three edited volumes "LAMS and Learning Design" drawing on the LAMS and Learning Design conferences (Dalziel, Alexander& Kratjka, 2010; Alexander, Dalziel, Kratjka & Kiely, 2011; Alexander, Dalziel, Kratjka & Dobozy, 2013). There have also been a number of special journal editions on Learning Design, such as several special issues of the Journal of Interactive Media in Education (JIME) and Teaching English with Technology (TEwT).

Learning Design Futures

Looking ahead, there are many areas where the field of Learning Design may develop further. In the conceptual domain, it remains to be seen if the Larnaca Declaration will be broadly accepted as a foundation for future research and development, particularly its use of the music notation analogy and its arrangement of core concepts, and the three part categorisation of the field into Learning Design Frameworks, the Learning Design Conceptual Map and Learning Design Practice). The outstanding challenge of creating an expressive and widely adopted notational framework for teaching and learning activities remains for the future, although the examples offered in the Larnaca Declaration provide a glimpse of how this may evolve. However, the role of students as co-creators and managers of learning designs requires further investigation, especially in relation to informal learning contexts where the role of educator is minimal or absent.

One notable area for future conceptual development in the author's opinion is the idea of "pedagogic descriptors" of activities within learning designs. Both Laurillard (2012) and Conole (2013) have developed a small number of descriptors for activities (such as "Acquisition", "Discussion", "Inquiry", "Practice", "Production"), and by applying these descriptors to activities within a sequence (with potentially several descriptors needed for a single activity), it becomes possible to analyse a learing design sequence not just in terms of the activity tools used (eg, forum, chat, quiz, etc), but in terms of the pedagogical purpose of these activities. A promising attempt at mapping these descriptors to both Moodle and LAMS activities is given in Bower, Craft, Laurillard & Masterman (2011), and there is considerable potential to refine and expand this approach.

As the field of Learning Design continues to grow as a distinct area of research, it will useful to compare and contrast it with other related areas of study. There are valuable links to be made between Learning Design and other e-learning research with a strong focus on collaborative learning, such as Computer Supported Collaborative Learning (especially the connection between CSCL scripts and learning design sequences). In a similar way, the evolving research on educational patterns could be further connected with Learning Design ideas. There are already examples of cross-over research between these fields and Learning Design (eg, McAndrew, Goodyear & Dalziel, 2006), but a wider discussion between these fields is likely to be of mutual benefit – perhaps a joint conference of experts in these fields would be a useful next step.

Another major area of research that is yet to fully interact with Learning Design is Instructional Design. There are significant differences in philosophy and practice between these two areas, although there are areas of potential common ground. Based on some initial skirmishes in discussions online and at conferences, this interaction will be vigorous when it comes to full fruition, but both fields are likely to benefit from wisdom

distilled from this discussion once the dust has settled. It is the author's view that in time, Learning Design will come to be seen as a superset of Instructional Design, but given the relatively broad, existing development of Instructional Design, and the less developed new field of Learning Design, this will take some time to judge.

While there are many incremental developments that can be made to Learning Design technologies, one significant development would be the rise of an "app" based Learning Design system – that is, a system that can sequence and co-ordinate a variety of educational apps. One of the pedagogical weaknesses of the explosion of interest in mobile devices and apps is a tendency to see apps as "silos" – that is, each app is used for a particular educational purpose, but without an easy way of linking together multiple apps to achieve broader educational goals. Learning Design has both the conceptual and technical foundations to assist with the development of "educational app sequencing" – so it will be interesting to observe how this possibility evolves.

Central to the future success of Learning Design will be its ability to harness the goodwill and efforts of both educational researchers and educators. While there are some promising examples of broad research collaboration (eg, between Learning Design researchers in Europe and Australia), and practical implementation (especially in some universities and schools), there is much more to be done to move Learning Design from a niche field to broader adoption. This will require a mixture of greater conceptual clarity, wider promotion of both theories and practice, mature technology and online communities, and a growing research base of lessons learned from implementation. While the field has made a promising start, there is much yet to do.

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