Australian Government | Office for Learning & Teaching

Success factors for implementing Learning Design

Final report 2014

ALTC National Teaching Fellowship

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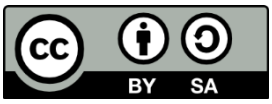
http://larnacadeclaration.org/

MACQUARIE UNIVERSITY

Support for the production of this report has been provided by the Australian Government Office for Learning and Teaching. The views expressed in this report do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.



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2014

ISBN 978-1-74361-503-4 [PRINT]
ISBN 978-1-74361-504-1 [PDF]
ISBN 978-1-74361-505-8 [DOCX]

List of acronyms used

ACARA	Australian Curriculum, Assessment and Reporting Authority
AICC	Aviation Industry Computer-based-training Committee
AIS	Association of Independent Schools
ALTC	Australian Learning and Teaching Council Ltd
AUTC	Australian Universities Teaching Committee
CeLS	Collaborative eLearning System
CETIS	Centre for Educational Technology and Interoperability Standards
CoCo	Centre for Research on Computer Supported Learning and Cognition
CSA	Christian Schools Australia
DIISRTE	Department of Industry, Innovation, Science, Research and Tertiary Education
ICEM	International Council for Educational Media
IMS GLC	IMS Global Learning Consortium
JISC	Joint Information Systems Committee (UK)
LAMS	Learning Activity Management System
LD	Learning Design
LD-CM	Learning Design Conceptual Map
LD-F	Learning Design Framework
LD-P	Learning Design Practice
LDSE	Learning Design Support Environment (renamed “Learning Designer”)
LKL	London Knowledge Lab, University of London
PBL	Problem-Based Learning
POE	Predict – Observe – Explain
OLT	Australian Government Office for Learning and Teaching
SCD	Sydney College of Divinity
SCORM	Shareable Content Object Reference Model
TPACK	Technological Pedagogical Content Knowledge
WISE	Web-based Inquiry Science Environment

Executive summary

The Australian Teaching and Learning Council National Teaching Fellowship *Success factors for implementing Learning Design* provided an opportunity for a series of meetings with international experts to develop a new conceptual model for the future of Learning Design, named "The Larnaca Declaration on Learning Design". This model provides guidance for implementing Learning Design to improve teaching and learning in higher education, including discussion of how Learning Design contributes to related areas such as graduate attributes, curriculum planning, the use of technology in education and massive open online courses (MOOCs). The Larnaca Declaration has subsequently become a focal point for discussion in the field of Learning Design, for example, it was the major focus of the Learning Design strand of the ICEM 2013 conference in Singapore.

The fellowship also supported a set of workshops across Australia about practical implementation of Learning Design, including examples of generic teaching strategies and discipline specific examples. Participant responses to these workshops indicated a growing interest in the field of Learning Design, and it is expected that the practical adoption of Learning Design in higher education will continue into the future. The fellowship also provided an opportunity to meet with international experts in Israel, Greece, the United Kingdom and the USA. Of particular note was the experience of the Learning Design community in Greece – this particularly successful group demonstrates the importance of a central individual who acts as a co-ordinator, encourager and champion for the adoption of new technology approaches. Future adoption of Learning Design will benefit from more individuals who will take on this key co-ordinator role in different regions, and in different discipline areas.

The outcomes of the fellowship included a book chapter, two journal articles, three refereed conference papers, two edited conference proceedings, nine unpublished conference presentations, and a total of thirty-two presentations/workshops. The most significant outcome is the "Larnaca Declaration on Learning Design", available from www.larnacadeclaration.org Other materials are available at: www.learningdesigntimeline.wordpress.com and ongoing discussion is hosted at the Learning Design Network Facebook group: www.facebook.com/LearningDesignNetwork.

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Report overview

Chapter 1 of this report provides an overview of the fellowship's program of activities and reflections on these activities. Unlike subsequent chapters which deal with theoretical and practical issues in the field of Learning Design, this chapter focuses on a descriptive review of the Fellowship itself – it would be of most interest to those with an existing interest in the field of Learning Design and the activities of this fellowship.

Chapter 2 provides an overview and history of e-learning and the field of Learning Design, including discussion of wider educational issues such as graduate attributes and open education. It also provides an overview of the "LAMS" (Learning Activity Management System) software and its role in Learning Design. This chapter would be the mot appropriate starting point for those who are new to the field of Learning Design.

Chapter 3 ("Larnaca Declaration on Learning Design") represents the major theoretical output of this fellowship arising from discussions with Learning Design experts – it seeks to provide a conceptual foundation for future elaboration of the field of Learning Design. This chapter would be of most interest to Learning Design experts and others with expertise in pedagogical theory.

Chapter 4 provides a practical example of a novel teaching strategy – Developing Scenario Learning – and its application using Learning Design principles and the LAMS software. This chapter provides an example of how an educator can practically apply the concepts of Learning Design arising from this fellowship.

Fellowship Overview

This Fellowship *Success factors for implementing Learning Design* project (hereafter "fellowship") started in July 2011 and was completed in December 2012. Key activities included:

Sep-Oct 2011	Meetings with Learning Design (LD) groups in Israel, Greece, UK & USA, including LD expert meeting held in Oxford
Dec 2011	Hosting of LD expert meeting in Sydney
Apr-Jul 2012	Project workshops held in Sydney, Brisbane, Melbourne, Adelaide, Canberra, Perth and Darwin
Sep 2012	Meeting of LD experts in Larnaca, Cyprus & ICEM Conference symposium
Nov 2012	Meeting of LD experts in Sydney

The significance of these activities to the fellowship is discussed further below.

Background to the fellowship

Prior to the start of this fellowship, I had been actively involved in Learning Design research and implementation since 2002, primarily through my leadership of the open source "LAMS" (Learning Activity Management System) Learning Design software system (first released in 2003) and the related "LAMS Community" (first released in 2005), an online community of practice that incorporates a repository of learning designs. When this fellowship was first proposed in April 2011, the LAMS Community had approximately 6700 members and 820 learning designs.

Associated with these activities were a number of research conferences on LAMS and Learning Design: a conference held in Sydney in December each year (starting in 2006) and another conference held overseas in the middle of each year (UK – 2007, 2009, 2010, Spain 2008, Singapore, 2011) – for more details, see http://lamsfoundation.org/conferences.htm
In addition, Diana Laurillard and I had co-hosted several meetings of Learning Design experts around the time of the UK conferences to explore the conceptual foundations of the field of Learning Design and to consider directions for future research.

These prior activities provided a foundation for the fellowship in terms of Learning Design theory, practical activities and an existing network of researchers and practitioners. Looking ahead to the future, it is my intention to continue working in this field after the completion of the fellowship, so it is useful to view the fellowship as part of an extended body of research and development stretching both before and after the fellowship, rather than as a stand-alone project. This background is important for understanding developments within the project in three key areas described below: theory, adoption and communities.

Learning Design theory

One of the challenges of leading an open source initiatives, such as LAMS, is that the countless practical demands of software development and implementation can limit the time available for reflection, particularly on theoretical foundations – thus the fellowship provided a welcome opportunity for extended reflection on the lessons learned over the past eight years of day-to-day development and implementation, and their theoretical implications for the future of the field of Learning Design.

A significant theoretical outcome of the fellowship arose from perceived problems with the conceptual foundations of the field of Learning Design. Meetings of experts held prior to the fellowship had wrestled with the key ideas underlying the field of Learning Design for several years, and despite the benefits of these discussions, there was a sense among many experts that there were significant unresolved problems with the conceptual foundations of Learning Design – particularly with the concept of Learning Design as a "pedagogical metamodel" (Koper, 2001). These problems were felt to be limiting the potential uptake of the field due to confusion over key terms and concepts.

These problems continued to be felt during discussions at the UK meeting of experts held as part of this fellowship in late September 2011 – attended by Diana Laurillard, Grainne Conole (fellowship evaluator) and other experts, and again at the December 2012 two day meeting of experts held in Sydney as a key event for this fellowship. At the Sydney meeting there was, for the first time, an explicit discussion of this problem itself and the need to attempt to solve it – particularly the need for documentation of the solution together with the general lessons learned from the field of Learning Design to date. Several participants at the Sydney meeting saw the fellowship as an opportunity to address this situation as a group of experts, and encouraged me to facilitate this process.

After the Sydney meeting, following ongoing discussion by email, a subgroup decided to submit a proposal for a Symposium on Learning Design to the ICEM Conference in Cyprus in September 2012, and to hold a two day meeting of experts prior to this conference in Larnaca, Cyprus to continue the discussions. It was during the second day in Larnaca that a number of significant conceptual breakthroughs were achieved, and these ideas were developed during subsequent discussion at ICEM and by email. On this basis, I wrote up a first draft of these ideas on behalf of the group as the "Larnaca Declaration on Learning Design". Taking advantage of Grainne Conole's visit to Australia in November, the group met together in Sydney to discuss the first draft, and based on extensive feedback, a second draft was created and circulated after this meeting, leading to a second round of edits in order to produce a final working version of the Larnaca Declaration – which is included as Chapter 3 of this report.

While it was not anticipated at the start, the Larnaca Declaration has become a key outcome of the fellowship, and it has the potential to provide a foundation for conceptual and practical work in Learning Design into the future. The expert group plans to continue working on these ideas in 2013, potentially for an edited book and/or journal special edition.

Learning Design adoption

Prior to this fellowship I had given many presentations and workshops on Learning Design and the use of LAMS. From these presentations I had learned some of the factors that facilitate and hinder adoption of Learning Design concepts by educators in both universities and schools. These factors include: the level of pedagogical understanding among educators, their level of technical expertise in using web applications, the perceived relevance of Learning Design for immediate discipline-based teaching challenges, and the willingness of educators to explore innovations in teaching methods and technology.

As many of the benefits of Learning Design arise from the sharing of effective teaching strategies that can be applied to many different discipline contexts, an ongoing challenge for Learning Design is the extent to which educators can think abstractly about teaching methods independent of their particular discipline.

For several years in Learning Design discussions I have used an example from developmental psychology to attempt to explain this challenge. One of Piaget's key observations is the shift from concrete to abstract modes of thought in the later years of child development. It has subsequently been noted that adults may retain concrete rather than abstract modes of thought about certain ideas – for example, a non-mechanically minded academic may have remarkably concrete and naïve ideas about how a car engine operates, whereas a motor mechanic may have a sophisticated abstract concept of car engine operation (arising from exposure to many different car engine examples over many years).

Academics typically have highly evolved abstract concepts about their discipline of study, but some have quite concrete ideas about teaching methods. Some academics "teach as they were taught", and may have had limited exposure to alternative teaching methods. As a result, they may have only limited abstract concepts about teaching methods and the variety of possible methods that could be used.

Given this, when an academic is exposed to a novel teaching method in a learning design, if their concepts about teaching methods are concrete rather than abstract, they may face challenges in understanding the teaching method. From experience, this problem is particularly evident when an educator is shown a novel teaching method that uses discipline content from a discipline different to his or her own.

The academic who can think in abstract terms about teaching methods can ignore the "foreign" discipline content and focus on the teaching method and how this might be applicable to his/her own context; whereas the academic who thinks in concrete terms about teaching methods may find it hard to separate the discipline content from the teaching method, and given that the foreign discipline content is irrelevant to their own work, they may dismiss the whole learning design.

One solution to this problem is to provide a "discipline-free" version of a teaching method – that is, an example of a teaching method with no discipline-specific content (but with indications in the learning design of where the content would be inserted – what has elsewhere been called "transdisciplinary pedagogical templates", Dobozy, Dalziel & Dalziel, 2013). However, some educators also find this discipline-free format difficult to understand, so a useful approach is to provide two examples at the same time – a discipline-specific teaching method using some widely recognised content, together with a discipline-free template of the same teaching method. This approach was used for the fellowship workshops conducted in mid 2012 using the two Predict – Observe – Explain examples available at http://practicaleteachingstrategies.com/strategies/poe.html (which are themselves based on work by Matthew Kearney for the AUTC Learning Design project). Discussion with workshop attendees indicated that this strategy of showing two examples was a better way of fostering understanding and adoption of learning designs than past approaches of showing only a single example (of either a foreign discipline example or a discipline-free example).

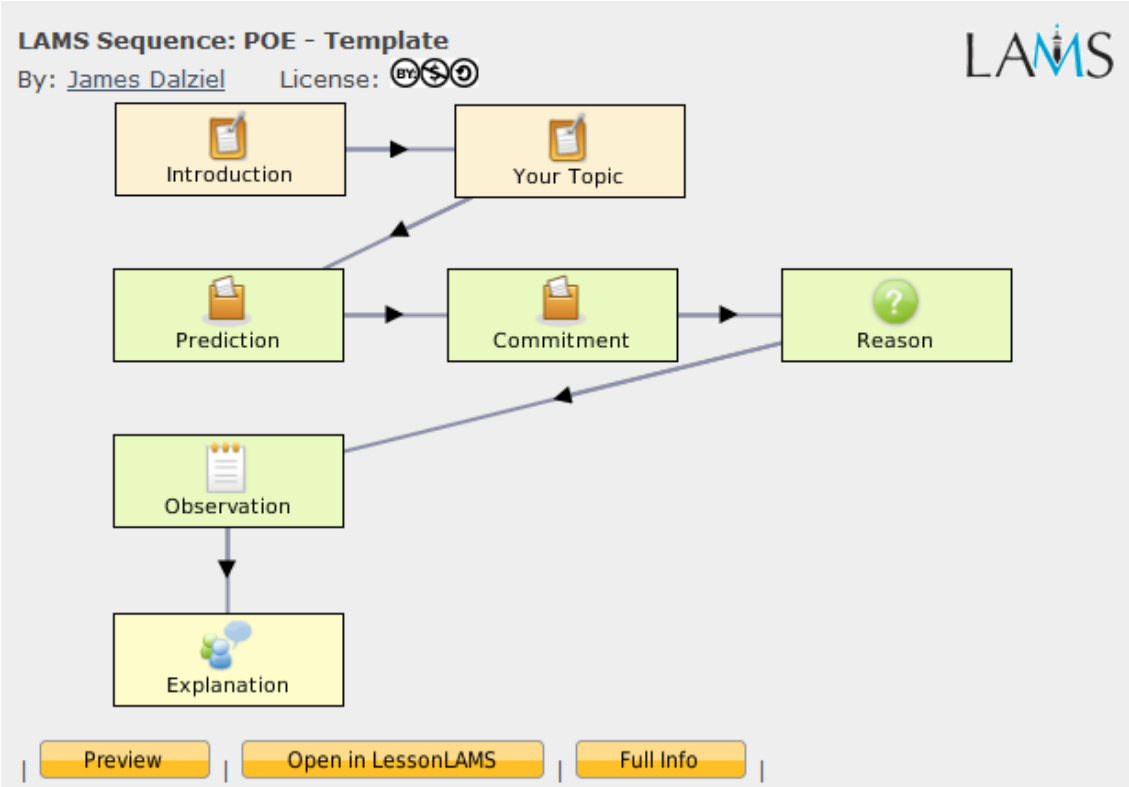


Figure 1: Example of Predict – Observe – Explain template from http://practicaleteachingstrategies.com/strategies/poe.html

However, the problem of abstract versus concrete thinking about teaching methods seems to also apply to the use of Learning Design technology, not just teaching methods. During my visit to Israel, I had the opportunity to meet Miky Ronen from the CeLS (or MyCeLS) project. While the field of Learning Design has produced many prototypes, CeLS is one of the few production-grade systems to have been implemented in a range of contexts, and hence Miky has learned some similar implementation lessons to those I have learned with LAMS.

Miky explained that one of the challenges she had seen in adoption of templates is that while CeLS can support a range of multimedia content, such as text, images, video and audio (as with LAMS), one problem with showing a template to educators is that they may focus overly on a single aspect of the technology and dismiss the use of the system overall if the example does not match their own discipline requirements.

For example, if a template shows a picture as its initial stimulus content, then an educator who would not use a picture (but rather, say, audio) might reject the template as being irrelevant, even though it would be a simple reconfiguration of the software to use audio instead of a picture. Subsequent discussions with the WISE project at the University of California, Berkeley noted a similar phenomenon. This seems to be another example of concrete versus abstract thinking in adoption of Learning Design, but in this case the problem is in the reaction to the technology, rather than the teaching method.

One way to conceptualise both problems is using the TPACK framework of Pedagogical, Technological and Content knowledge (Koehler & Mishra, 2009): educators may have strong abstract thinking abilities about their discipline content knowledge, but they may be more concrete in their thinking about pedagogical knowledge (e.g., the teaching method example above) and technological knowledge (e.g., the CeLS image example above). These challenges limit the adoption of Learning Design where educators perceive the teaching method or technology to be inappropriate for their own discipline needs and do not see past the immediate "concrete" example to the more general potential of the Learning Design to be adapted to suit their context.

In practical terms, this observation from the CeLS experience informed the fellowship workshops in mid 2012 where I used a range of different technologies in my main example (the "Hammer and Feather" Predict – Observe – Explain learning design, which uses text, video, audio and images to explore the dropping of a hammer and a feather on the moon). Informal feedback from workshop participants indicated that showing a breadth of technologies helped avoid mistaken assumptions about the potential use of learning design templates.

More generally in terms of the workshops, attendance numbers were considerably higher in several cases than other similar Learning Design workshops conducted prior to this fellowship (e.g., 60-90 for this fellowship compared to 10-30 in the past). There are several possible reasons for the higher numbers, such as the recognition arising from the ALTC/OLT Fellowship itself. In discussion with participants, many noted a sense that Learning Design was finally "coming of age", and that after a slow initial period of development from 2000-2010, the concepts of re-usable teaching methods (and their implementation in technology) was of increasing interest in 2012, including in relation to massive open online courses (MOOCs). So it appeared from informal participant feedback that this fellowship was a timely contribution to wider interest in e-learning, and in the concepts of Learning Design.

Learning Design communities

The LAMS Community provides an online environment for discussion and sharing of Learning Designs. As at the end of this fellowship (December 2012), the LAMS Community had 8200 members and 1120 shared learning designs that had been previewed/downloaded 43,700 times.

One of the most fascinating "subgroups" of the LAMS Community is the Greek community of LAMS users. This group of approximately 250-300 educators has been particularly active in using a version of LAMS that is translated into Greek. This community is the first non-English speaking community to share sequences through the LAMS Community – there are over 60 shared Greek language sequences to date.

I was fascinated to learn more about the success of this community, and so as part of my fellowship travel in September 2011, I visited Greece to give a presentation at the Hellenic Open University and meet with members of this group. As I suspected from previous discussions, a crucial part of the success of this group was due to a

particularly active individual – Spyros Papadakis – who has acted as a champion/ encourager/facilitator for this community, both in face-to-face and online contexts.

This experience supported my suspicion that successful adoption of Learning Design in certain communities is often highly dependent on one (or more) active champions who illustrate possibilities to their colleagues, support them with training and technical advice, and illustrate by example the ways that Learning Design can assist with innovative teaching – Spyros Papadakis deserves high praise for this work. More generally, this experience illustrates the value of individuals who act as a "hub" for colleagues in a geographical region to explore the benefits of Learning Design. I believe similar factors could apply to discipline-based communities – for example, where an active champion in the discipline of, say, psychology, could act as a hub for others with an interest in the use of Learning Design in psychology.

Fellowship workshops

Apart from the meetings with Learning Design experts and other researchers described above, a major component of the fellowship was a series of workshop across Australia to promote the concepts of Learning Design, and to illustrate how these could be adopted in everyday teaching. Workshops were held in Sydney, Melbourne, Brisbane, Canberra, Adelaide, Darwin and Perth. A recording of the workshop together with the relevant slides is provided through the fellowship website. Three of the workshops outside Sydney had high levels of participation: 60-90 attendees.

The workshop format was a two hour session based on a one hour presentation about Learning Design, and a one hour extended discussion and question and answer session – this second hour often involved more detailed examples and demonstrations of Learning Design in action. Attendees were invited to provide feedback on each workshop, and suggestions were used to improve and adapt the workshops as they progressed around Australia – particularly the structure of discussion in the second hour.

A second set of four discipline workshops was planned for the areas of teacher education, medicine, research methods and volunteering. However, it became apparent during the life of the fellowship that it was difficult to bring together enough individuals with an interest in Learning Design from each of these discipline areas in a single geographical location to support a workshop. While there was interest in Learning Design in these disciplines, it was too diffusely spread for a workshop. Following liaison with discipline experts and OLT, an alternative approach was adopted to provide recorded presentations online for each discipline area to be disseminated to interested individuals in each area, and each presentation was informed by prior discussion of Learning Design and related issues with experts in each discipline area. These presentations are provided as part of the fellowship website.

Apart from these planned workshops, a range of other Learning Design presentations were provided as opportunities arose both in higher education and school contexts – a list of presentations is provided below. Of special note was an unanticipated but growing interest in Learning Design in the field of theological and Christian education – a total of seven presentations were given in this area across a range of theological colleges, Christian schools and related conferences. These presentations aligned well with the ALTC/OLT *Transforming Theology* project among Australian theological colleges, and it is expected that collaboration in this area will continue in the future.

Event Date	**Event title, Location**	**Brief description of the purpose of the event**
29/7/11	Navitas English Internal Conference, Sydney	Professional Development for Navitas English staff. General presentation with Learning Design case study.
10/8/11	Christian Schools Australia Principals Conference, Gold Coast	Annual Conference for CSA. General presentation with Learning Design case study
9/9/11	Sydney College of Divinity Professional Development workshop, Sydney	Professional Development workshop for SCD staff on online learning. General presentation with Learning Design case study
22/9/11	Learning Design Workshop, Haifa, Israel	Workshop for this Fellowship
26/9/11	Learning Design Workshop, Patras, Greece	Workshop for this Fellowship
29/9/11	Pedagogic Planner Meeting, Oxford, UK	Pedagogic Planner meeting for this Fellowship
30/9/11	JISC CETIS Design Bash, Oxford UK	Co-hosted workshop with CETIS and this Fellowship
3/10/11	LDSE Project Meetings, London, UK	Meetings with LDSE project team, hosted by Diana Laurillard, LKL for this Fellowship
7/10/11	Meeting with WISE team, Berkeley, USA	Meeting with WISE team to discuss this Fellowship
14/10/11	AIS Integrators Conference, Sydney	Annual conference for AIS school Integrators. General Presentation with Learning Design case study
3/11/11	CoCo Research Festival, Sydney	University of Sydney CoCo Research Festival. Keynote on Learning Design
9/12/11	6th International LAMS and Learning Design Conference, Sydney	Keynote presentation on Learning Design for Conference
12-13/12/11	Fellowship Learning Design Experts Meeting, Sydney	2 day meeting for this Fellowship with Learning Design experts

23/1/12	Hope Conference, Pacific Hills Christian School, Sydney	Presentation on Learning Design & LAMS
27/4/12	Learning Design Workshop, University of Queensland, Brisbane	Workshop for this Fellowship
27/4/12	Queensland Studies Authority Conference, Brisbane	Presentation on Learning Design & LAMS
25/5/12	Adelaide University, Adelaide	Workshop for this Fellowship
30/5/12	Swinburne University, Melbourne	Workshop for this Fellowship
13/6/12	OLT, DIISRTE, Sydney	Workshop for this Fellowship
27/6/12	University of Sydney, Sydney	Workshop for this Fellowship
2/7/12	University of Canberra, Canberra	Workshop for this Fellowship
10/7/12	Curtin University, Perth	Workshop for this Fellowship
19/7/12	Morling Theological College, Sydney	Presentation on Learning Design and LAMS
25/7/12	Charles Darwin University, Darwin	Workshop for this Fellowship
13/8/12	School of Christian Studies, Sydney	Presentation on Learning Design and LAMS
24-25/9/12	Meeting in Larnaca, Cyprus	2 day meeting for this Fellowship with Learning Design experts
28/9/12	ICEM 2012 Conference, Nicosia, Cyprus	Symposium Presentation on Learning Design by experts from Larnaca meeting
1/10/12	Nanyang Technological University Innovations in Teaching Conference	Presentation on Learning Design and LAMS
7/10/12	Global Christian Schools Network, Switzerland	Presentation on Learning Design and LAMS
7/11/12	E-learning Symposium for Australian College of Theology	Presentation on Innovation in Higher Education Teaching and Learning, Learning Design and LAMS
20/11/12	Meeting at Macquarie University, Sydney	Meeting of experts to follow up Larnaca meeting and discuss editing of “Larnaca Declaration”
7/12/12	7th International LAMS & Learning Design Conference, Sydney	Presentation on “Developing Scenario Learning” teaching strategy
7/12/12	7th International LAMS & Learning Design Conference, Sydney	Keynote Presentation on the Larnaca Declaration

Table 1: Summary of Learning Design presentations related to the topic of this fellowship and workshops for the fellowship.

Fellowship evaluation

The fellowship evaluator was Professor Grainne Conole, originally of the Open University UK at the start of the fellowship and subsequently at the University of Leicester. As an internationally recognised expert in the field of Learning Design, Grainne played a dual role for this fellowship as both an active participant in expert discussions and as a critical friend/sounding board over the life of the fellowship.

Grainne and I had regular contact over email, Facebook and Skype to discuss the fellowship and related development in Learning Design, and Grainne attended the key face-to-face expert meetings in the UK in September 2011, Sydney in December 2011, Cyprus in September 2012 and Sydney in November 2012. Grainne's formative evaluation role was of great value to me as the fellowship evolved, particularly as she help to draw out the wider implications of the developing ideas. She provided introductions to other colleagues in the field of Learning Design (particularly encouraging me to meet with Yannis Dimitriadis – an important connection for the future). She played a significant role in contributing to the ideas of the Larnaca Declaration, and encouraged me to write this up on behalf of the wider Learning Design community. I am greatly indebted to her for her friendly, helpful and yet searching questions and advice across the life of this fellowship.

In her final evaluation report, Grainne draws attention to the importance of the international collaboration fostered by this Fellowship, and the value of bringing together experts for extended discussion/debate of difficult concepts. Grainne rightly points out the importance of meeting for in-depth discussion on several different occasions over the life of the fellowship as the catalyst for this development – and notes that the two "planned" meetings were insufficient for the breakthrough represented in the Larnaca Declaration – this occurred during the third meeting, and a fourth meeting was needed to edit the draft document. This outcome suggest the importance of going beyond the initial plan of the Fellowship to keep pursuing difficult ideas until a breakthrough occurs, even if it goes beyond initial deadlines.

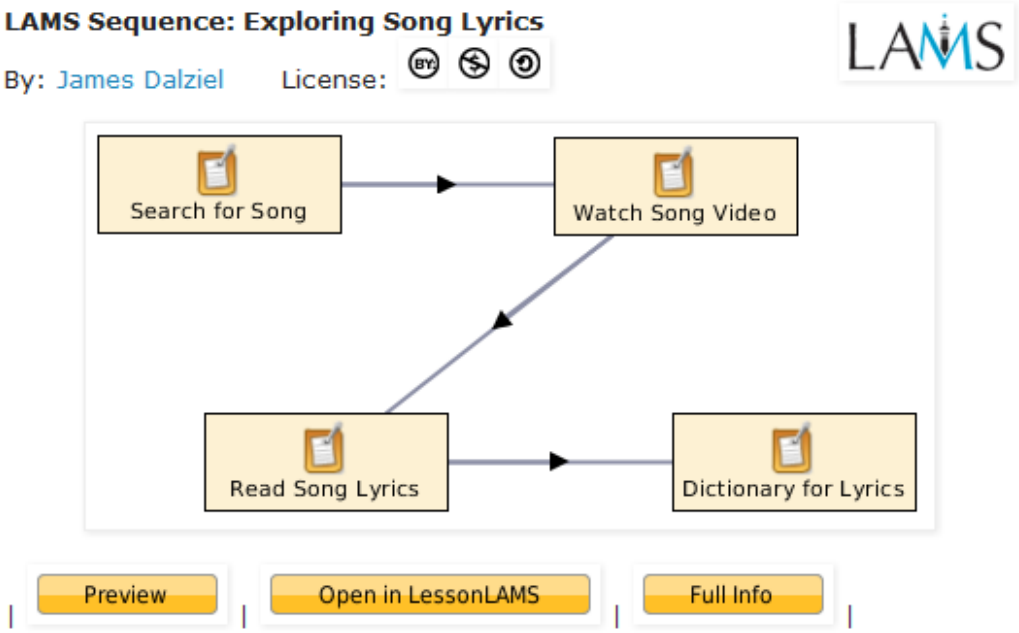
In terms of the fellowship objectives, the evaluation describes how these have been met, and especially how the Larnaca Declaration played a significant role in these objectives. As noted by a number of experts interviewed for the evaluation, the Fellowship came a timely moment for the development of the field of Learning Design, and the collaboration network fostered by the Fellowship was appreciated by both experienced and early career researchers alike. It is expected that this network will continue to build on the ideas arising from this Fellowship into the future.

Learning Design exemplars

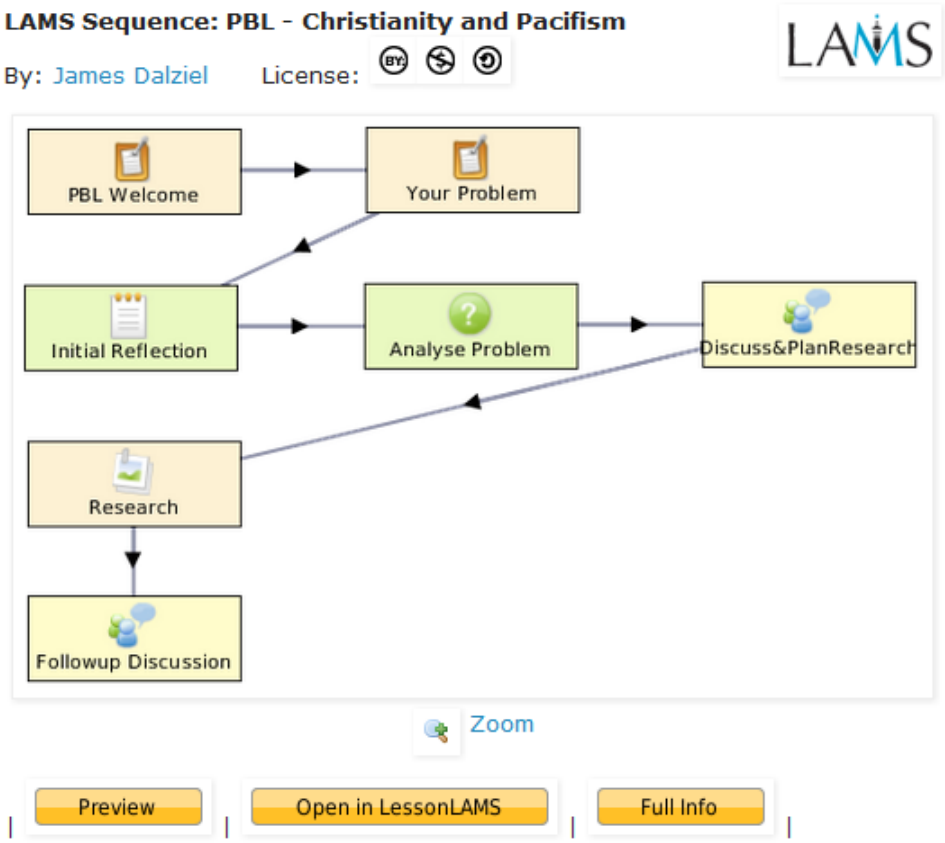
One final component of the fellowship has been the development of exemplar Learning Designs – in some cases these are for particular discipline areas (e.g., English example below), in other cases these are generic teaching methods that

could be applied in my disciplines (e.g., Developing Scenario Learning – see Chapter 4). The following exemplars were created during the fellowship:

Example 1 – from Navitas English Presentation
Available online at: http://jamesdalziel.blogspot.com.au/2011/08/exploring-song-lyrics.html



Example 2 – from SCD Professional Development workshop
See http://jamesdalziel.blogspot.com.au/2012/01/problem-based-learning-example.html



Example 3: “Compare and Contrast” collaborative learning sequence – see Chapter 2
http://www.lamscommunity.org/lamscentral/sequence?seq_id=1458328

Example 4: “Developing Scenario Learning” sequence – see Chapter 4

Example 5: “Preaching in Acts” sequence – see:
http://www.lamscommunity.org/lamscentral/sequence?seq_id=1464563

Example 6: “Versailles Role Play” – a demonstration of the IMS Learning Design Best Practice Guide Versailles Role Play using LAMS – see:
http://www.lamscommunity.org/lamscentral/sequence?seq_id=1456162

Example 7: Learning Design Support Environment Predict Observe Explain mapping into LAMS – this sequence was built to illustrate how a Learning Design built in another system (Diana Laurillard’s Learning Design Support Environment) could be implemented in LAMS. This example was created as part of the CETIS DesignBash meeting in September 2011. See
http://www.lamscommunity.org/lamscentral/sequence?seq_id=1334409

In addition, a number of existing discipline sequences and templates from past work were used during presentations for the fellowship, particularly the six Predict – Observe – Explain, Problem-Based Learning and Role Play sequences available at
http://www.practicaleteachingstrategies.com/

Chapter 2: LAMS and Learning Design: e-learning history[1]

Background

E-learning

E-learning or "technology enhanced learning" has considerable potential for education. A major benefit of e-learning to date has been the delivery of individual, self-paced learning modules. The advantages of this approach are considerable – students can study content at their own pace, in their own time, and in any location with appropriate technology.

However, education is usually much more than an individual simply working through content, regardless of whether the content is delivered by a computer or a book. It also includes collaboration and debate among students, mentoring by educators, and personal reflection on learning that leads to changes in how a student approaches life. Until recently, these other elements of education have been weak or absent in e-learning, which can result in an impoverished model of education when individual, self-paced learning is assumed to be all that is required (Downes, 2003).

Part of this narrow view of e-learning arose from the success of computer based training in corporations, especially in the aviation industry, which led to the AICC (Aviation Industry Computer-based-training Committee) and SCORM (Shareable Content Object Reference Model) technical standards (Advanced Distributed Learning, 2012) for delivery of e-learning content. While there were many practical benefits arising from technical standardisation of e-learning content formats, an unfortunate by-product was a constrained view of education itself.

There are certain contexts where collaboration or mentoring may be impractical (e.g., non-digital distance education for students in remote locations), but the vast majority of educational circumstances (be they schools, universities or other educational contexts) provide opportunities for learning with others. With the rise of technologies that support collaboration (e.g., email, forums, chat, blogs, wikis, audio and video conferencing, virtual classrooms) there is no reason for e-learning to remain limited to an individual, self-paced learning model, and yet in practice this limited approach remains widespread (Downes, 2003). In summary, one practical weakness in the use of e-learning to date has been an overemphasis on content and an under-emphasis on collaborative learning.

[1] This chapter is adapted from parts of Dalziel, J. (2011). Learning Design, LAMS and Christian Education. *Journal of Christian Education,* 51, 39-56.

Scaffolding of learning

One of the challenges that educators face when planning effective learning activities is avoiding activities that are too simple and those that are too hard for a given stage of student learning. Ideally, educators select activities to extend their students beyond their current knowledge and skill levels, but if the activities prove too great a "leap" for students from their current understanding, they can become disheartened due to their lack of progress. Educators need to select activities that find a balance between being too easy (where students become bored) and too difficult (where students give up).

The solution to this general educational challenge is appropriate scaffolding of student learning (Lipscomb, Swanson & West, 2004). Educators build on what students already know and can do, and select activities that will take students further in their understanding, but with appropriate support to encourage incremental progression. This does not mean that students are not given challenging activities – indeed, it is important for teachers to set high but realistic expectations for their students (Van Brummelen, 2009). Rather, the focus is on how to support students progressing in learning at an appropriate pace relative to existing knowledge and skills.

While scaffolding of learning is a common feature of individual, self-paced e-learning, it is much less common for collaborative learning technologies. For example, a virtual classroom system may provide features for educators to deliver lectures and interact with students, but there is little or no potential for creating a structured sequence of collaborative learning activities to scaffold student learning in a planned way. And while an innovative teacher may implement a sequence of activities "on-the-fly", the system does not assist with the planning of these activities, nor is any record of the activity sequence kept in a way that can be reused or shared with other educators. In other words, new collaborative e-learning technologies (such as virtual classrooms) provide certain benefits, but these technologies rarely address the need for scaffolding of learning that includes collaboration.

Generic skills

Education is not simply the acquisition of discipline knowledge but also the development of "generic skills" such as effective communication, problem-solving, the ability to work in teams, critical thinking, creativity, etc. The concept of generic skills goes by different names – such as "21st Century skills" (Partnership for 21st Century Skills, 2011) and "generic capabilities" (ACARA, 2010) in schools, and "the generic attributes of a graduate" in universities (Barrie, 2005). While the selection and naming of skills also varies among lists, there is broad agreement that education for the future requires a greater focus on these skills rather than simply the acquisition of more discipline knowledge.

It can be argued that developing these generic skills is not new to education (as the Socratic method illustrates), but the recent focus on these skills arises from a desire for students to be more able to apply learning so as to become effective "knowledge workers" and active participants in civil society (rather than simply memorising content for tests and promptly forgetting it). It is also worth noting that the recent increase in the sum of knowledge in many disciplines has often left educators (especially university lecturers) at a loss to know how to cover the breadth of modern knowledge, which sometimes leads to an overemphasis of content at the expense of generic skills.

However, generic skills should not be taught separately from discipline knowledge, as these skills are ideally developed via activities wrapped around discipline content (Barrie, 2005). For example, problem solving is a crucial skill for doctors, and yet traditional medical education typically provides extensive lecturing on medical content, but limited opportunities for solving medical problems and gaining feedback on attempts at problem solving. A new approach to medical education called "Problem Based Learning" (PBL) has gained considerable adoption in recent years by changing the focus of learning to small-group analysis of real world problems, followed by research on potential solutions, leading to debate about the correct solution to a given problem. The benefit of this approach is that it requires students to use their medical knowledge in a practical way to solve realistic problems, and uses teamwork and tutor facilitation to provide feedback on weaknesses in proposed solutions (Wood, 2003).

As many generic skills are developed through interactions between students (e.g., teamwork, communication, problem-solving, intercultural understanding, etc.), this provides a further reason for seeking a wider view of e-learning that incorporates collaborative learning. While certain skills are best developed in face to face collaborative interactions (e.g., oral communication), there are other skills that can be developed in both face to face and e-learning environments, provided that the e-learning technologies support collaboration. In many cases, these skills require careful scaffolding of collaboration activities, and hence collaborative e-learning technologies that do not provide features for scaffolding may be of limited use.

Open source software, open content and open education resources

The Internet can make it much easier for people in many different places to work together. It can greatly diminish the "transaction costs" of distributed knowledge production (Benkler, 2006), that is, it is can be easier to find and work with like-minded people using the internet as opposed to working only with those in physical proximity. For example, there may be only a hundred specialists in the world in a particular research area, and few of these would live in the same city. By collaborating over the Internet, a group of experts can potentially achieve more via internet-connected-but-physically-distributed-collaboration than could be achieved by the few experts who were working together in the same place. While there is nothing about the Internet that guarantees that distributed collaboration will be successful (indeed, the barriers to success are not trivial), the potential is significant.

Perhaps the most extraordinary example of this model of internet-based distributed knowledge production is open source software. In recent years we have seen the rise of open source software than matches or exceeds the performance and features of the best equivalent commercial software systems in many areas (Weber, 2004): e.g., the Linux operating system, the Apache web server, the Firefox web browser, and in education, the Moodle Learning Management System. These systems have been developed by programmers who freely share their code over the Internet and together discuss how to improve their software via distributed collaboration. While there are various models of decision-making in open source projects (e.g., "benevolent dictator" or a council of experts), almost all rely on the Internet for rapid, easy sharing of software code, bug fixes and ideas for future development.

For many users of open source software, its most attractive quality is that it is free of license costs. This is actually a by-product of the open source development model that requires that all programmers share their contributions freely in order for them to be combined and improved over time. As the Free Software Foundation (2010) notes:

> "users have the freedom to run, copy, distribute, study, change and improve the software… 'free software' is a matter of liberty, not price. To understand the concept, you should think of 'free' as in 'free speech,' not as in 'free beer'".

As attractive as this philosophy sounds, those unfamiliar with the model often assume it would be unworkable in practice due to a lack of license fees, and hence it would fail as a business model. In practice, there are many successful open source projects (Weber, 2004), often supported by alternative business models that do not rely on license fees (such as providing fee-based training and support).

Distributed knowledge production is not limited to software – an example from "open content" is the Wikipedia encyclopaedia. While this project is not without its critics, it is another large-scale example of distributed collaboration in action. Wikipedia and open source software rely not only on distributed collaboration, but also on free sharing of knowledge in a way that allows others to adapt and extend this work using legal agreements that foster, rather than inhibit, the sharing of copyrighted works, such as the General Public License for software and the Creative Commons licenses for content. They also illustrate non-traditional reward mechanisms, such as peer recognition, for motivating contributors. Taken together, Benkler (2006) has described this phenomenon as "commons based peer production".

Many in education have been captivated by the dream of applying similar ideas to the creation and sharing of educational resources. Imagine if the foundation content of traditional education was freely available from a global collection of education resources (built by educators who contribute resources based on their areas of expertise) with this collection available to any student in the world for self-study. Equally, teachers throughout the world could freely use these resources and adapt

them to the needs of their local students. A teacher could also share the adapted version back to the global collection, thus increasing the range and diversity of materials available to all other educators.

One statement of these principles for education is the "Cape Town Open Education Declaration" (2007). This summarises the transformative potential for education from open development, sharing and re-use of education resources, including software and teaching methods. It should not be assumed that this approach is antithetical with commercial educational content (indeed there are now publishers who provide textbooks based on freely available content, e.g., Flat World Knowledge). Rather, it is a different model of production and distribution of knowledge artefacts that may (e.g., Britannica) or may not (e.g., Microsoft) have a major impact on traditional commercial business models.

E-learning can be based equally on traditional copyrighted educational content or freely available open educational content, but it is fair to say that there has been significant interest in open sharing of e-learning content among many researchers in the field (e.g., signatories to the Cape Town Declaration). As the Cape Town Declaration notes, free sharing of resources applies not only to educational content, but also to software and teaching methods. It should be noted that the intent of the Cape Town Declaration is not that educators should be forced to share their resources freely with others, rather, it is to encourage those educators who share the vision of free sharing to work together for maximum collective benefit.

Taken together, this review of e-learning, scaffolded learning and open education resources lays a foundation for understanding the field of Learning Design and its implementation in the Learning Activity Management System (LAMS).

Learning Design

Learning Design as a new field of e-learning has its origins in the work of several mostly independent projects in Europe and Australia in the late 1990s and early 2000s, particularly: the work of Rob Koper and colleagues at the Open University of the Netherlands on the Educational Modelling Language technical specification (Koper, 2001) and its evolution into the IMS Learning Design specification (IMS Global Learning Consortium, 2003); the work of Diana Laurillard and colleagues associated with the SoURCE project and related work at the Open University UK (Laurillard & McAndrew, 2003); the AUTC Learning Design (2002a) project in Australia; and my own work on LAMS at Macquarie University (Dalziel, 2003).

There are various descriptions of Learning Design that reflect the different emphases and scope of different approaches to the field. IMS Learning Design (2003) states:

> "The IMS Learning Design specification supports the use of a wide range of pedagogies in online learning. Rather than attempting to capture the specifics of many pedagogies, it does this by providing a generic and flexible language. This language is designed to enable many different pedagogies to be expressed."

Koper (2001) has used the phrase “pedagogical meta-model” to describe Educational Modelling Language, in the sense that the language or framework should be broad enough to describe many different approaches to teaching and learning.

However, Learning Design is not like traditional educational theories. Unlike, say, constructivism, which posits a theory about how students learn (and hence how teachers should teach), Learning Design does not put forward a theory about how students learn – it rather attempts the more basic task of describing the sequence and kind of activities that occur in everyday teaching and learning. It can be understood by analogy with musical notation: the way that music is written down does not determine whether a given piece of music is, say, baroque or romantic in style; rather, music notation provides a common framework of describing musical experiences that is equally able to represent different styles of music.

The Learning Design framework can be summarised as “people doing activities with resources/environments”: “people” includes student and teacher roles (and potentially other roles where appropriate, such as an external expert); “activities” are what teachers and learners actually do (such as giving/listening to lectures, participating in class discussions, conducting lab work, private reading); and “resources/environments” can be the content of an activity (such as an article or video) or the environment needed to conduct an activity (such as a classroom for discussion; or in the case of e-learning, an online discussion forum). This three-part model can be thought of as describing the “who?” (people), “what?” (activities) and “how?” (environments/resources) of each activity. At the level of the whole set of activities, two other elements can be added: “when?” (the sequence of activities) and “why?” (the learning objectives or outcomes that guide the way a given learning design is constructed).

Given the focus on teachers and groups of students, Learning Design has had a strong emphasis on collaborative learning; and given the focus on sequencing, on scaffolding of learning. Hence, Learning Design has been an important counter-weight to narrow views of individual self-paced e-learning such as SCORM (although Learning Design can also be applied to individual learning contexts, or a hybrid of individual and collaborative learning activities). Indeed, a focus on collaborative learning was a key driver in the creation of the field of Learning Design, and while Learning Design software systems seeks to support a wide range of pedagogical approaches, it is reasonable to argue that these systems give more prominence to collaborative learning possibilities than many other e-learning systems.
While the phrase “Learning Design” (with capitals) is used to describe the whole field of study, it can also be used (without capitals) to refer to a single example of teaching and learning. An individual learning design is typically made up of a sequence of individual activities with each activity incorporating relevant roles and resources/environments. The “sequence” need not be a single linear pathway as it may include branching or parallel tasks (such as for different small group activities), loops/cycles and other kinds of “flow” between activities over time.

In the case of a class that is made up only of a lecture, or alternatively made up only of a general discussion, these special cases could be described as a "single activity" learning design – there may be limited value in using the Learning Design approach to describe these scenarios. The Learning Design approach is most useful when considering contexts where a teacher has prepared a structured set of (different) activities over time to facilitate student learning (as is more typical of classroom teaching in schools, or tutorials/seminars/laboratory practicals in universities).

Consider the following example of a learning design based on the idea of "compare and contrast" – note that this "generic" learning design could be used in many different disciplines. A teacher introduces a new topic with some content (e.g., article, video, lecture, website), then students are broken into small groups (e.g., 4 groups), then students discuss the initial content in their small groups, then the teacher introduces a second content resource with different information or a different perspective, then students discuss the ideas of this different content in their small groups, then the teacher has students compare and contrast the two different content examples in a whole class discussion. Finally, the teacher has students complete an assignment on the topic, such as writing an essay to compare the different perspectives and giving the student's own view with reasons.

This Learning Design can be described using a simple table format (Dalziel, 2008) that draws attention to the "who", "what" and "how" elements of each activity, and the overall sequence (when) and objectives (why). Table 2 illustrates this example based on a class of 20 students. It includes alternative "how" options for either face to face or online implementation.

Learning Objectives - Why? [This section would include discipline-specific objectives related to the chosen content; as well as generic skills such as critical thinking, teamwork, effective communication]			
Sequence - When?	What?	Who?	How? (Face to face / Online)
Step 1 (10 min)	Consider Content A	Each student (20 x 1)	Teacher gives lecture/ students read or watch video
Step 2 (1 min)	Break into groups	4 x group of 5 students	Teacher chooses groups/ system randomly allocates
Step 3 (10min)	Small group discussion	4 x group of 5 students	Small group discussion of Content A in corners of class/ groups discuss online in private forums
Step 4 (10min)	Consider Content B	Each student (20 x 1)	Teacher gives lecture/ students read or watch video
Step 5 (10min)	Small group discussion	4 x group of 5 students	Small group discussion of Content B in corners of class/ groups discuss online in private forums
Step 6 (15+ min)	Whole class discussion	1 x 20 students (+ teacher facilitated)	Whole class discussion / online forum for whole class

Step 7 (outside class)	Write Essay	Each student (20 x 1)	Student writes essay and gives to teacher for marking / uploads essay online

Table 2: Example of "compare and contrast" learning design described using a table format; including alternatives for face to face or online delivery (see How?). Suggested timing for a 1 hour class is included.

For school educators, this table format may be reminiscent of a lesson plan, and standardised lesson plan formats share similarities with the Learning Design approach. However, most lesson plans include additional information, such as how the activities relate to the wider unit of work. A written Learning Design format, such as this table, aims to provide more precise description of the actual activities and how they are arranged, and hence this table approach could be incorporated into traditional lesson plans for greater specification of activity details. It is this more precise description of activities that proves essential for implementation in e-learning (see below).

This learning design is not specific to a particular discipline topic – it could be used in many different disciplines. One of the great promises of Learning Design is the potential to distil and share effective teaching methods that can be used across many different disciplines (e.g., a "role play"); and also to explore how effective methods from one discipline (e.g., Problem Based Learning in medicine) can be transferred to and/or adapted for other disciplines. These special types of learning designs can be called templates or generic learning designs (Dalziel, 2010).

Generic learning designs provide an example of where traditional educational theory re-enters the field of Learning Design. If a particular theory posits that students learn best by investigating and solving real world problems (as proposed in Problem Based Learning theory), then it is possible to build generic learning designs that instantiate the typical sequence of activities expected by this educational approach (Dalziel, 2010). A PBL-based generic learning design could then be used as a template to speed the process of implementing different content examples based on this theory (such as across a medical degree heavily based on Problem Based Learning). A generic learning design based on one educational theory could also be compared and contrasted with a generic learning design based on a competing theory, and in this situation, the Learning Design representational approach can provide a common framework for comparing different educational theories in terms of their concrete implications at the level of classroom implementation.

For the example given above it is worth recognising that the use of technology is not a requirement of this learning design. The field of Learning Design is better understood as a general framework for all kinds of education, of which e-learning is simply one mode of delivery – it just happens that historically much of the early work on Learning Design arose from e-learning. When Learning Design is implemented using e-learning, there is the potential for appropriate software systems to facilitate the sequence of activities that the teacher has selected – for the example above, the Learning Design software could present the content to students

(as a webpage, downloadable article, or video), then allocate students into small groups, then provide each small group with a private online discussion area (such as a forum or chat area), then present the second content, followed by areas for further small group discussion, then a whole class discussion area, then finally a place for uploading essays for marking by the teacher.

Going beyond the role of software in facilitating the activities of a learning design, it is possible to imagine a Learning Design "authoring" system which provides educators with tools to create sequences of activities, and to populate activities with relevant content, questions, assessment tasks, etc. Once a learning design has been created and saved in such an authoring system, this design itself could become shareable, so that a teacher could share an effective learning design with other teachers, who could then use (or adapt) it with their own students (assuming sharing under an open educational resources approach). The dream of sharing learning designs that instantiate effective teaching methods as ready-to-implement online sequences has been a major driver of the broader field of Learning Design, and was at the heart of the development of LAMS.

LAMS (the Learning Activity Management System)

LAMS was designed to implement the concepts of Learning Design described above in a software system that could be used by typical educators in day to day classrooms and online education. This required LAMS to be relatively easy to use (as opposed to other Learning Design systems that require special technical skills and understanding) and to be stable for use by many educators and students at the same time. In order to facilitate sharing, a learning design authored in LAMS could be exported from the system as a file that could be shared with others. All LAMS features are used via a web browser.

While the goal of LAMS was to create a system that could instantiate many different pedagogical approaches (in keeping with the Learning Design concept of a pedagogical meta-model), an initial sequence of activities called "What is Greatness?" was developed (in conjunction with Dr Donna Gibbs of the School of Education, Macquarie University) that would act as an initial test of the flexibility of the underlying system – for more details see Dalziel (2003).

The first version of LAMS was completed in 2003 and was subsequently trialled in schools (e.g., Russell, Varga-Atkins & Roberts, 2005) and universities (e.g., Masterman & Lee, 2005). After several years of incremental development and improvement, a complete redevelopment of the software saw the launch of the second version in 2006. "Version 2" of LAMS has proved a solid foundation for ongoing development which continues to this day with the release of LAMS V2.4 in early 2012. LAMS is used by thousands of educators across many countries, and is translated into 32 languages (Dalziel, 2012). The LAMS software was made freely available as open source software (under the General Public License Version 2) in 2005 and continues to be released using this approach.

The LAMS software includes features for sharing learning designs among users of a particular instance of the software (e.g., within a school or university). To foster global sharing, the online "LAMS Community" (www.lamscommunity.org) was launched in late 2005 – this community website provides a repository for educators to share LAMS learning designs that they have created in order that other educators can view, use and adapt these shared designs. It also includes areas for discussion among educators. As at April 2012, this community had over 7700 members and 1000 shared sequences (Dalziel, 2012).

The LAMS software has four main areas: an "Authoring" area where educators create sequences of activities and populate these with relevant discipline content; a "Monitoring" area where educators can launch a sequence with a group of students and track their progress through the sequence (including features for educators to interact with students where appropriate – such as in a discussion forum); a "Learner" area where student access the sequence(s) set for them by their teachers to work through the relevant activities; and finally a "System Administration" area for technical staff who maintain a LAMS server. Most students would only see the Learner area (although there have been some fascinating projects where educators have given students the ability to author activities for their peers, such as several projects demonstrated at the 5th and 6th International LAMS & Learning Design conferences). Most educators would only see the Authoring, Monitoring and Learner areas.

To take the "compare and contrast" example described above, an educator could create a sequence of activities in LAMS authoring to implement this approach – using, say, the Noticeboard tool for content (e.g., text or video), a Forum tool for discussion, and the Submit Files tool for uploading an essay for marking. The Grouping tool would also be used to split students into subgroups, and the resulting groups would be applied to the relevant forums (the application of groups is seen in the "extra box" outline for the first two discussion forums in Figure 2 – it is absent from the third whole class forum, which is not running in small group mode). It should be acknowledged that different activity tools could be selected to achieve a similar outcome – for example, synchronous "Chat" could be used instead of asynchronous "Forums".

An example of how this sequence could appear in LAMS authoring is provided in Figure 2. This example includes use of a feature that allows renaming of the activity tools to reflect the type of activity (see the Title area of "Properties" at the bottom of the image) – this allows the default tool name of, say, "Noticeboard" to be changed to "Content A". Activity tools are dragged and dropped from the Toolkit on the left into the main area, and connections between activities are created by clicking on the "Transition" button, then clicking and dragging between two activities (resulting in a line with an arrow). An example of how this sequence would appear to students in the Learner area is provided in Figure 3.

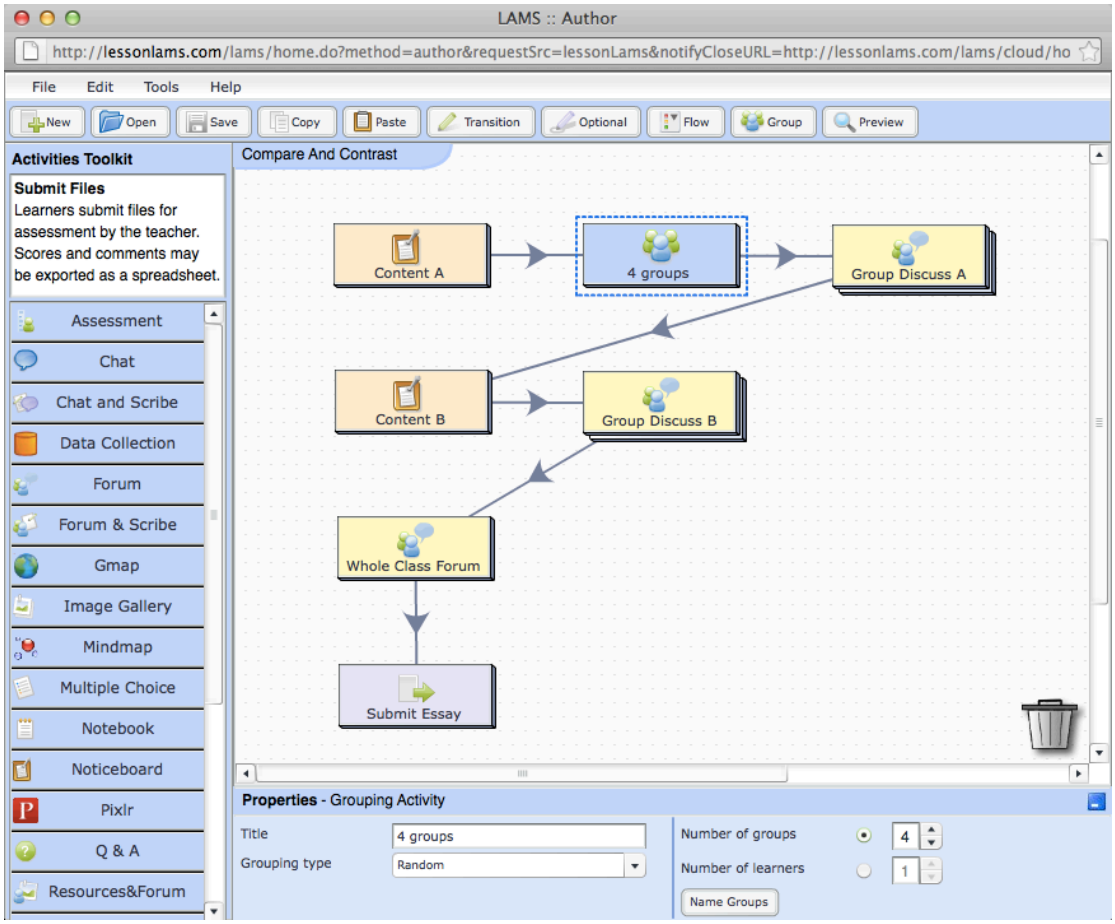


Figure 2: “Compare and contrast” example in LAMS Author. A copy of this sequence is available at http://www.lamscommunity.org/lamscentral/sequence?seq_id=1458328

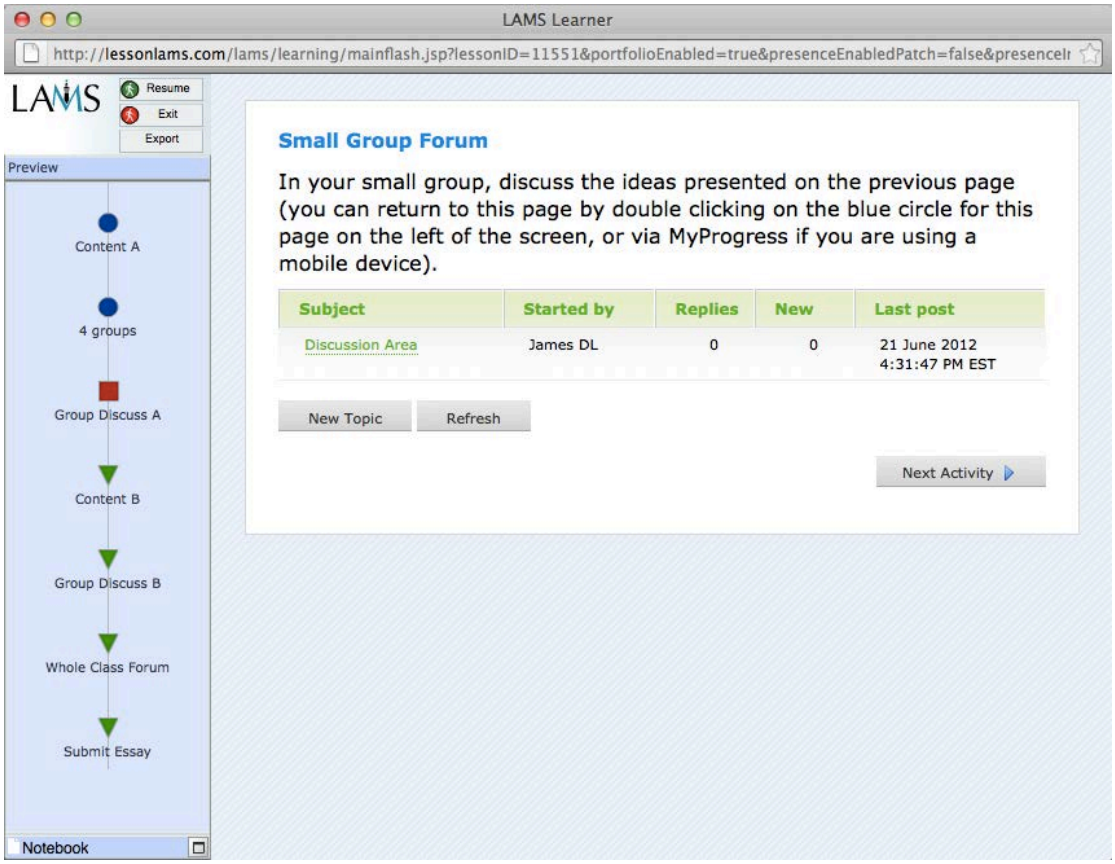


Figure 3: Learner view of the compare and contrast sequence, showing the student at the third activity (small group forum). Note that blue circles on the left indicated completed activities, the red square is the current activity, and green triangles are activities yet to be completed.

The Authoring area includes a number of features applicable to the construction of a whole learning design, such as “grouping”, “branching”, “optional activities” and “gates”, as well the features of individual activity tools – in LAMS V2.4, these tools are:

1. Assessment: Advanced quiz and assessment (see also Multiple Choice)
2. Chat: Live (synchronous) chat
3. Chat & Scribe: Chat + features for a scribe to record group answers
4. Data Collection: Collection and sharing of data by students
5. Forum: Asynchronous discussion forum
6. Forum & Scribe: Forum + features for a scribe to record group answers
7. Gmap: Google maps (including private annotations for student groups)
8. Image Gallery: Viewing and sharing a set of images
9. Mindmap: Individual or shared visual mindmap
10. Multiple Choice: Simple multiple choice quizzes (see also Assessment)
11. Notebook: Recording of private student reflections
12. Noticeboard: Web content (1 page); e.g., learning objectives, instructions to students, discipline content, multimedia (e.g., images, audio, video)
13. Pixlr: Image editing and sharing (like a simplified Adobe Photoshop)
14. Q & A: Question and Answer, where student answers are shared with the class (either anonymously or named)

15. Resources & Forum: Share Resources (see below) + Forum
16. Share Resources: Links to websites/files; display of packaged websites (.zip or IMS Content Package); option for student sharing of websites/files
17. Spreadsheet: Online spreadsheet (like a simplified Microsoft Excel)
18. Submit files: Students upload an assessment file(s) for marking by teacher
19. Survey: Collection of student responses to multiple choice, multiple response and/or open questions, collated data provided to teacher
20. Task List: List of tasks for students, tasks may require comments or files
21. Video Recorder: Recording, sharing and commenting on student videos
22. Voting: Voting on options, with collated class votes shown after voting
23. Wiki: Shared wiki area for group editing of webpages

Details about individual tool features and other LAMS "How tos" are provided at http://wiki.lamsfoundation.org/display/lamsdocs/Home
There is a standardised technical interface for adding new activity tools into LAMS (Ghiglione & Dalziel, 2007) that allows programmers to build new tools to extend the features of LAMS. Specialist tools that have been developed that are not included in the "standard" LAMS installation, but are available to be added (e.g., the "e-Adventure" online simulation tool, Blanco, Torrente, & Fernández-Manjón, 2010; the "Wookie" widget tool, see http://wiki.lamsfoundation.org/display/lams/Wookie).

The visual authoring area of LAMS is one of the most frequently discussed features of LAMS – many educators have found that visualising a learning design has an impact on their planning of teaching and learning and on the way they reflect on their pedagogical approaches. It appears that for some educators, visualisation helps to make an implicit process of lesson planning into a more explicit, "conscious" process of decision making about the selection and arrangement of student activities (Masterman & Lee, 2005).

In terms of research on LAMS, there have been a range of studies covering both school and university contexts in a variety of disciplines. There have been 11 academic conferences about LAMS and Learning Design, held in Australia, Europe and Asia, and the proceedings of these conferences provide examples of LAMS and related research (see http://lamsfoundation.org/conferences.htm). Various LAMS conference articles have been published in three special editions of the Teaching English with Technology journal (in Volume 9, Issues 2 and 3 in 2009, and in Volume 11, Issue 1 in 2011). These conferences and journals provide an excellent starting point for further investigation of LAMS and related Learning Design issues beyond the scope of this chapter.

Chapter 3: The Larnaca Declaration on Learning Design

Introduction

Education faces many challenges in the changing modern world. Learners are changing in their approaches to education – they use digital technologies, they multi-task, they collaborate and they are becoming less patient with teacher-centric styles of education.

Educators[2] face many changes – such as expectations of adopting innovative teaching approaches, alignment of teaching to external standards, growing requirements for professional development and difficulties in balancing a complex range of demands from different stakeholders.

Government and educational institutions also face many changes, such as the rise of the knowledge economy and the need for different kinds of graduates, a shift from knowledge scarcity to abundance, and the impact of technology – especially the internet via open sharing of educational resources and massive open online courses (MOOCs).

In the context of these changes, effective teaching and learning in the classroom[3] (and beyond) remains central. How can educators become more effective in their preparation and facilitation of teaching and learning activities? How can educators be exposed to new teaching ideas that take them beyond their traditional approaches? How can technology assist educators without undermining them? How can learners be better prepared for the world that awaits them?

This paper describes how the new field of Learning Design contributes to the central challenge of improving teaching and learning. Learning Design can assist educators to describe effective teaching ideas so that they can be shared with, and adapted by, other educators. While the field has primarily focussed on higher education and K-12 schools to date, it also has implications for vocational and professional training. This paper describes how ongoing work to develop a descriptive language for teaching and learning activities (often including the use of technology) is changing the way educators think about planning and facilitating educational activities. The ultimate goal of Learning Design is to convey great teaching ideas among educators in order to improve student learning.

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[2] We have chosen “educator” rather than “teacher” to provide a more inclusive term that applies not only to K-12 teachers, but also to university lecturers and vocational/professional trainers.

[3] We mean classrooms in the broadest sense – also including lecture halls, seminar/tutorial rooms, laboratories, fieldwork contexts and online.

The paper begins with this Introduction, followed by an analogy from music to provide a context for Part 1, which considers the possibility of educational notation. Part 2 describes how this possibility is being realised in the field of Learning Design, illustrated with an example based on a Role Play. Part 3 considers current definitional challenges in Learning Design and its provocative aspiration towards pedagogical neutrality. Part 4 provides a wider conceptual map of education for exploring the place of Learning Design, including more examples of current Learning Design approaches, and how the map can be used to analyse pedagogical theories. Part 5 returns to the relationship between Learning Design and pedagogical theories, and the central question of effective teaching and learning approaches. The Conclusion offers a new synthesis of the ideas discussed in this paper as a foundation for the future of Learning Design, and the Epilogue returns to the music analogy to reflect on the future prospects of this synthesis.

While the concepts discussed in this paper have potentially far-reaching implications for many aspects of education, this paper is written primarily for those with an interest in Learning Design and in pedagogical theories. Future work based on this paper will explore these ideas in different ways for other audiences, such as policy makers and typical educators.

An analogy from music

In the history of music there was a time long ago when some people argued it was impossible to write down music – music was too special, too ethereal – to ever be reduced to written form.

However, over many years the Western music tradition slowly developed a notational system for describing and sharing musical ideas. This standard format allowed great musical ideas to be shared from one musician to another without a need for personal contact.

As a result, a musician living hundreds of years later, in a very different context, can still understand the musical ideas of a composer long ago, and with appropriate skills, can reproduce those musical ideas.

Music notation does not capture everything about musical ideas – there remains a significant role for performers to bring their own interpretations to music. But musical notation contains *enough* information to convey musical ideas from one person to another over time and space.

Music notation does not guarantee beautiful music – indeed, mediocre music can be written down just as precisely as beautiful music. Music notation allows for many different styles of music to be described using a single notational framework. And while the Western notational framework is sufficiently broad to describe many types of music, it contains limitations that make some kinds of music (e.g., quartertone singing) difficult to describe within the standard format.

The purpose of creating musical notation was not simply the abstract concept of music representation; rather, it was a vehicle for conveying great musical ideas to others. This sharing helps other musicians to learn the crafts of performance and composition, as well as enriching countless lives who listen to music that they would never have heard if it had not been written down many years ago.

Part 1: Educational Notation?

Can we apply the lesson of music notation to education? Could we develop a way to describe the activities of educators and learners in classrooms (and online) so that great teaching ideas could be conveyed from one educator to another? Can we help to make implicit, private teaching ideas into explicit, shared ideas?

In this paper, we focus on the particular requirements of formal education where an educator plays at least some role in structuring learning activities for learners. Self-study, and learning in groups where there is no educator or educator-like role, is outside our current scope. This should not be taken to mean that we focus only on "teacher-centric" education – far from it – but it is simply to note that our scope is the potential for educators to learn about good teaching ideas from other educators. These ideas may call for an active role for the educator[4] in directing activities, or the educator's role may be to facilitate learners as active managers of their learning.

In one sense, we have made progress already. The "content" dimension of education is captured in books, websites, recorded lectures, videos and other resources. But content transmission is not the only dimension of education – otherwise educational institutions would need only libraries, rather than libraries and classrooms.

Describing teaching and learning activities – what educators and learners actually do in classrooms and online – is less developed. In many school contexts there is a tradition of written lesson plans, and individual educators in universities and vocational training may write down activity plans for tutorials and practical workshops. But there is no generally agreed notational system for educational activities that has the expressiveness or widespread adoption of music notation.

[4] Educators can play many different roles in the overall education lifecycle, such as: preparing educational content, preparing teaching and learning activities, implementing activities with learners in classrooms and online, facilitating discussion among learners, conducting and marking assessment, using evaluation to improve future education and others. In some cases, a single educator plays all of these roles for a group of learners; in others, a different educator may play each role. In this paper we use educator to mean anyone who plays any of these roles, and hence could benefit from examples of good practices and advice on adopting these practices.

If one stops to reflect for a moment, this is a surprising situation. Many educators could benefit from learning about the great teaching ideas of their colleagues, yet our ability to convey a great teaching idea from one educator to another is hampered by our lack of a common language for what we do in classrooms and online. We struggle to describe even something as simple as how different activities are conducted over time in a classroom (e.g., lecturing, small group debate, whole class discussion, individual reading, practical tasks, etc.) or its online equivalents.

Many very bright people have been educators, so the lack of a descriptive framework for education could be interpreted as follows: it is a very hard problem – if it wasn't, some bright person would have solved it already.

By comparison with music notation, a descriptive framework for teaching and learning activities would not describe everything that occurs – rather, it would seek to convey *enough* information so that one educator could benefit from the great ideas of another educator. These educational ideas could be of many different kinds, based on different underlying pedagogical theories, in a manner similar to different styles of music.

Just as with beautiful or mediocre music, an educational notation system would not guarantee that the ideas written down would be educationally effective – rather, it is simply a way of conveying an educational idea using a common framework. And as with the problem of representing quartertone singing in the Western music notation, any system of educational notation will have weaknesses in describing some types of education, even where it is strong at describing others. Given the hard nature of the problem and the immaturity of this field, it is likely that early educational notation systems will have many weaknesses and few strengths, but in the same way that music notation has improved over time, the same may occur for educational notation.

One important difference between music performances and teaching is that it is typical for musicians to faithfully reproduce the written musical idea. In education, however, there is an important role for educators to be able to adapt their teaching in response to the unique needs of their learners. This adaptation could take the form of reflecting on a great teaching idea from a colleague, then reworking the idea for a future class based on the educator's insights into his/her learners' needs. Another kind of adaptation is where an educator decides to change his/her approach in the middle of a class – perhaps because the original plan is not working out as expected, or interesting new ideas have arisen in class that are worth pursuing.

Interestingly, the analogy with music does not break down completely at this point. There are traditions of improvisation in music (e.g., Jazz) that take into account the immediate evolving music experience (often due to the musical interactions between performers). But even improvisation often uses some predetermined basic musical structures, such as the chord progressions in the twelve-bar blues.

Another point of comparison with music is whether the notation is for use by the creator of the musical experience, or for use by others. If a musician composes a piece of music for their own performance, they may not write it down using musical notation (or they may only write down a brief summary, such as guitar chords), as the musician remembers the details for performance. But when the musician wishes to convey the musical idea to another musician, musical notation becomes important. As many educators "compose" their teaching ideas for their own use, the need for notation may not be pressing in these cases; and yet when educators wish to convey a great teaching idea to other educators, they lack an agreed format for communication. An agreed notation format would also assist with other facets of education, such as documentation, quality assurance and enhancement of teaching and learning activities.

There are two compelling reasons for developing a system of educational notation. First, teaching is sometimes called the loneliest profession (Hooker, 1949) as individual educators often have little exposure to each other's teaching. In many ways, the craft of teaching is still at a relatively amateur stage, and lacks the professionalisation that would come from a richer language for describing the essence of teaching and learning activities. While there are examples of team teaching and teacher observation in some contexts, there is much more that could be done to share good teaching practice, and a common notational format could assist this sharing.

Second, modern society and business expect more of graduates than just content knowledge. Skills such as problem solving, teamwork, effective communication, creativity, intercultural understanding, critical thinking and others are required for success in the "knowledge economy". These skills have been called graduate attributes, soft skills, generic skills or 21st Century skills. These skills are difficult to learn in the abstract – instead, they need to be learned by working with content knowledge. Given this, transforming education for the 21st century means redesigning the core teaching and learning activities used with content knowledge, rather than simply adding extra courses on these broader skills, and leaving content teaching practices untouched.

As many educators find it challenging to combine content knowledge and the development of these broader skills in day-to-day teaching and learning activities, there is a need for professional development about innovative teaching structures for that address this challenge (such as Problem-Based Learning, Role Plays, WebQuests and similar teaching strategies). While there are many aspects to this professional development, there would be significant benefits from a common language for describing great teaching ideas, just as an important part of learning a musical instrument is understanding and playing great music.

While the primary focus of this paper is the implications of educational notation for pedagogical theory and practice, it should be noted that there are also productivity implications. If educators can easily re-use and adapt the good ideas of their colleagues, then the preparation time for teaching may decrease (consider the many

educators across the world re-inventing similar teaching plans each day). That is, successful sharing of good teaching ideas can lead not only to more effective teaching, but also to more efficient preparation for teaching. These productivity benefits may lead to increased cost effectiveness in some contexts, but for many educators, the benefit is more likely to be increased "time effectiveness" – that is, time savings in one area of teaching (e.g., preparation) allow for more time on other areas (e.g., more individual feedback to learners).

In summary, we take inspiration from the history and uses of music notation to try to imagine a descriptive framework for teaching and learning activities that is broad enough to describe many different pedagogical approaches. A framework of this kind could help to propagate great teaching ideas in order to enhance the effectiveness of educators, leading to richer learning experiences for learners. There are other examples of descriptive frameworks that could be considered – patterns and plans in architecture, recipes, the Unified Modelling Language (UML) in software development, dance notation, etc. We leave it to other experts to draw out lessons for education from other descriptive frameworks – in this paper we use music notation as an extended analogy for imagining education notation. In the next section we describe work on educational notation in the field of Learning Design, followed by a new conceptual map for Learning Design and the broader education landscape.

Part 2: Learning Design

The new field of Learning Design seeks to develop a descriptive framework for teaching and learning activities ("educational notation"), and to explore how this framework can assist educators to share and adopt great teaching ideas.

While there has been work on standardised lesson plans formats and re-usable educational software over several decades, the field of Learning Design has its origins in four somewhat distinct projects around the turn of the millennium. While the concept of a descriptive framework is applicable to all kinds of education – including online education and face-to-face activities – early work in this field was heavily focussed on technological implementation.

The first foundational project was the development of the Educational Modelling Language (EML) by Rob Koper and colleagues at the Open University of the Netherlands (Koper, 2001), which subsequently was adopted as the basis for the IMS Learning Design technical specification in 2003 (IMS GLC, 2003). The second was a diverse body of research on technology in higher education in the UK, particularly the SoURCE project (e.g., Laurillard & McAndrew, 2002) and the work of Diana Laurillard, Grainne Conole, Helen Beetham and others. The third project was the Australian Universities Teaching Council (AUTC) Learning Design project based at Wollongong University, led by Ron Oliver, Barry Harper, John Hedberg and Sandra Wills (this project had explicit links to the second project). The fourth project was the "Learning Activity Management System" (LAMS) project led by James Dalziel at Macquarie University, Australia (Dalziel, 2003).

All four projects had a similar underlying vision of improvement of teaching and learning through the development and implementation of a descriptive framework. For EML and LAMS, this led to a technical language for describing and sharing sequences of online learning activities (IMS LD and LAMS LD respectively) and software systems for teacher authoring and learner implementation of activities (ReLoad/CopperCore/SLeD and LAMS). To continue the music notation analogy, the technical language for implementation by an educational software system could be compared to using a piano roll with a mechanical player piano (or MIDI in modern electronic instruments). These projects also developed online communities for sharing of sequences (Unfold and the LAMS Community).

The SoURCE and AUTC Learning Design projects both developed exemplars of software systems, but not to the same level of implementation as the other two projects. However, these two projects included a strong focus on describing and sharing pedagogically effective sequences of activities – particularly the third project through an online library of examples (see www.learningdesigns.uow.edu.au). From these origins, a wide range of related projects, conferences and research activities arose, with a growing breadth of interests that incorporated not only technological issues but also support for educators in adopting innovative teaching methods – see Table 1 for a sample of areas and early examples.

Areas of Application of Learning Design	**Early Examples**
Foundation projects	EML/IMS Learning Design, SoURCE, AUTC Learning Design, LAMS
Advice to educators on adopting new teaching ideas	DialogPlus, LearningMapR
Description and sharing of particular teaching methods	EnRoLE (Role Plays), COLLAGE (e.g., Jigsaws)
Adaptation of existing technologies to implement Learning Design	MOT+, Grail (adaptation of .LRN)
Technology to support reflection on the design of teaching and learning	London Planner/Learning Designer, Phoebe, LAMS Activity Planner
Communities and/or repositories for Learning Design	Unfold, LAMS Community, Cloudworks
Major Learning Design-related funding programs	JISC Design for Learning, EU TenCompetence
Learning Design Conferences	LAMS Conferences, CETIS DesignBash, TenCompetence Conferences

Table 1: A sample of different areas of the growing field of Learning Design including early examples.

As at 2012, the body of work on Learning Design is beyond easy summary within the constraints of this article, so as an aid to those who are interested in understanding the field to date, we have developed a timeline of Learning Design-related initiatives/projects, communities, software tools, conferences and other key event and publications – this is provided in Figure 1, with more detailed information about the elements of this figure (as well as the projects noted in Table 1) available at http://learningdesigntimeline.wordpress.com/.

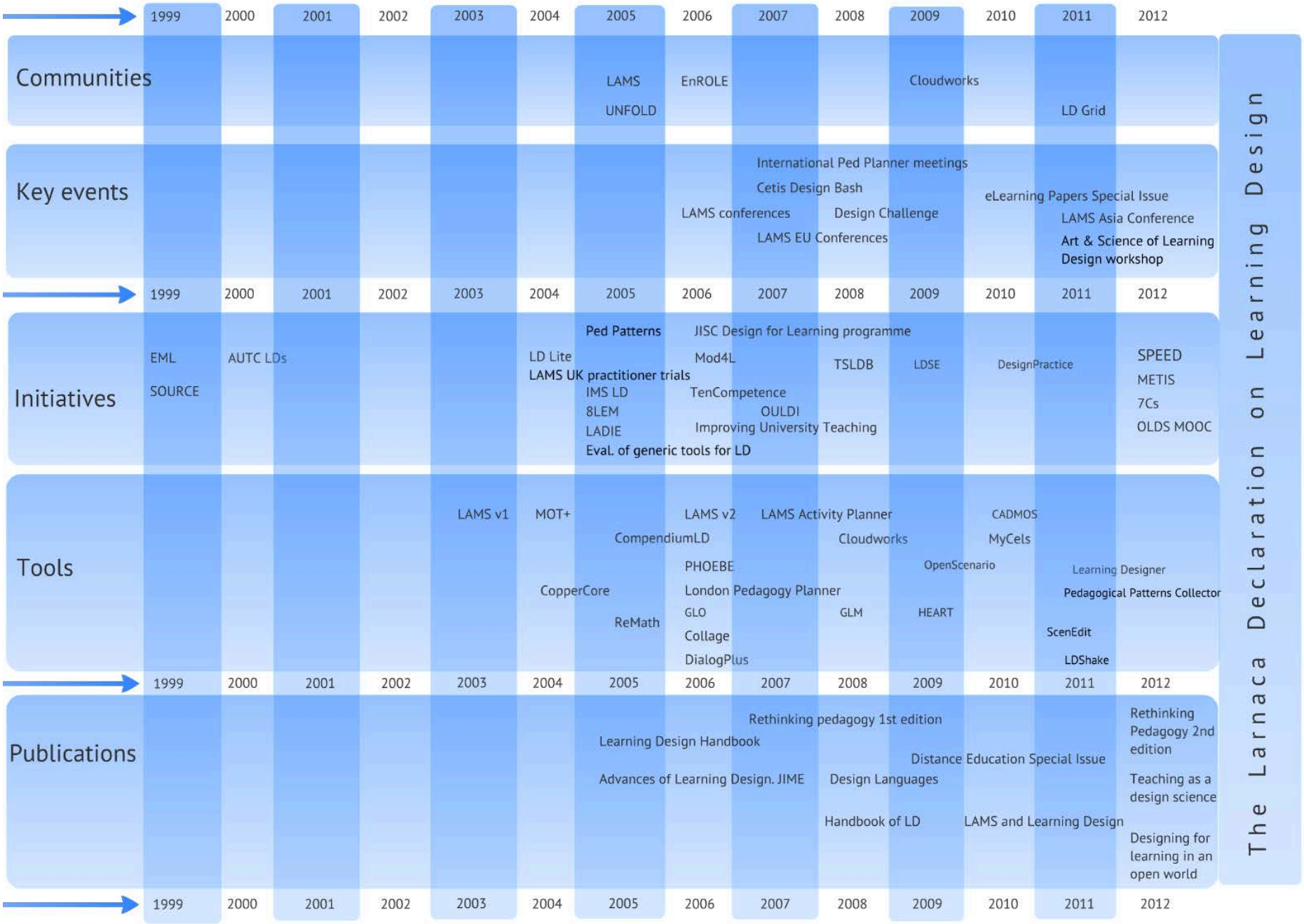

Figure 4: Timeline of developments in the field of Learning Design – dates are approximate

Part 2.1: Example of a learning design

Given the range of projects and software systems noted above, there are many ways to describe a particular learning design, but for the sake of clarity we provide one example below to provide a concrete illustration.

An innovative, potentially effective teaching strategy is a "Role Play". In this strategy, learners are presented with a scenario in which they take on different roles and then "play out" the scenario based on their allocated roles, with facilitation by the educator as required. Role Plays have been prominent in many discussions of Learning Design, such as the Versailles Use Case in IMS Learning Design, the six Role Plays in the AUTC Learning Design project, the EnRoLE Project, the Role Play Pattern in the COLLAGE project, and others.

There are some narrow types of Role Plays used in specific disciplines, such as practicing conversation in language learning or practicing a business interaction (e.g., a call centre conversation). However, the more general kind of Role Play typically involves a complex scenario in which learners take on a role that is unfamiliar to their normal life, and hence they need to try to see the world from someone else's perspective. This "walking in the shoes of another" is the most powerful quality of Role Plays as a teaching strategy as it can assist development of self-reflective/meta-cognitive skills. While Role Plays may not be suitable in some disciplines (e.g., mathematics), they can be used in many disciplines where understanding of different perspectives is relevant.

Putting aside the rationale for choosing a Role Play as a teaching strategy (the "why"), a Learning Design approach would seek to describe the sequence of teaching and learning activities that make up the Role Play experience (the "what and how"). The goal of this description is to provide educators with enough information that they could replicate this teaching and learning experience. In broad terms, a Role Play typically involves four main "phases":

1) A description of the scenario and the roles within it
2) Allocation of learners to roles, then learners prepare for the Role Play proper by seeking to better understand their allocated role. As multiple learners are often allocated to each role, this can involve each role group discussing their ideas about their role (privately).
3) The "Role Play proper", in which all learners come together to play out their roles in the given scenario.
4) After conclusion of the Role Play proper, learners debrief on the experience of playing their role and reflect on what they have learned from "walking in the shoes of another".

To give a concrete example of a Role Play in a school-based teacher training course:

1) The scenario is about the adoption of interactive whiteboards in a typical school. There are four roles in the imaginary school (teachers in favour of interactive whiteboards, teachers with concerns about interactive whiteboards, school management and school students).
2) Each participant in the Role Play is allocated to a role, and then each role group gets together privately to discuss their role and their ideas about the scenario, and how they could respond to the other role groups. They may also conduct research on the scenario as it relates to their role and discuss this within their role group.
3) All role groups come together to discuss/debate the merits of adopting interactive whiteboards in the imaginary school. Participants in each role group make their case, and interact with other roles as they play their own role while debating the merits of adopting interactive whiteboards.

4) After concluding the Role Play, the trainee teachers debrief as they "return to being themselves" and reflect on the discussion in the Role Play proper, and on how their personal views compare to those expressed in their role.

There are still many practical issues to be considered in implementing this Role Play – such as the timing of each activity, any particular resources required within each phase, the readiness of the learners to participate in this Role Play in the expected way, the role of the educator as facilitator/umpire, etc. An experienced educator may be able to make judgements on these issues from existing experience without requiring detailed descriptive information, whereas a novice educator may need more comprehensive advice on these details prior to implementation (just as an experienced musician can read music notation and infer how to interpret the music for a performance, but a novice musician may need more advice on interpretation).

One way of implementing this Role Play is in an online environment where discussion is conducted through an online forum (or similar tool). Figure 1 provides an example of the interactive whiteboards Role Play as represented in the Authoring environment of the LAMS Learning Design system. In this example, the first phase corresponds to a number of instruction pages about the scenario, then learners split into role groups, and within the "branching" area learners conduct a number of reflection and discussion activities about their role (activity detail not shown). Later, the educator/facilitator opens the "stop" gate so that learners enter the Role Play proper in a discussion forum. After concluding the Role Play proper, the educator/facilitator opens the second "stop" gate to provide learners with a series of reflective activities for debriefing.

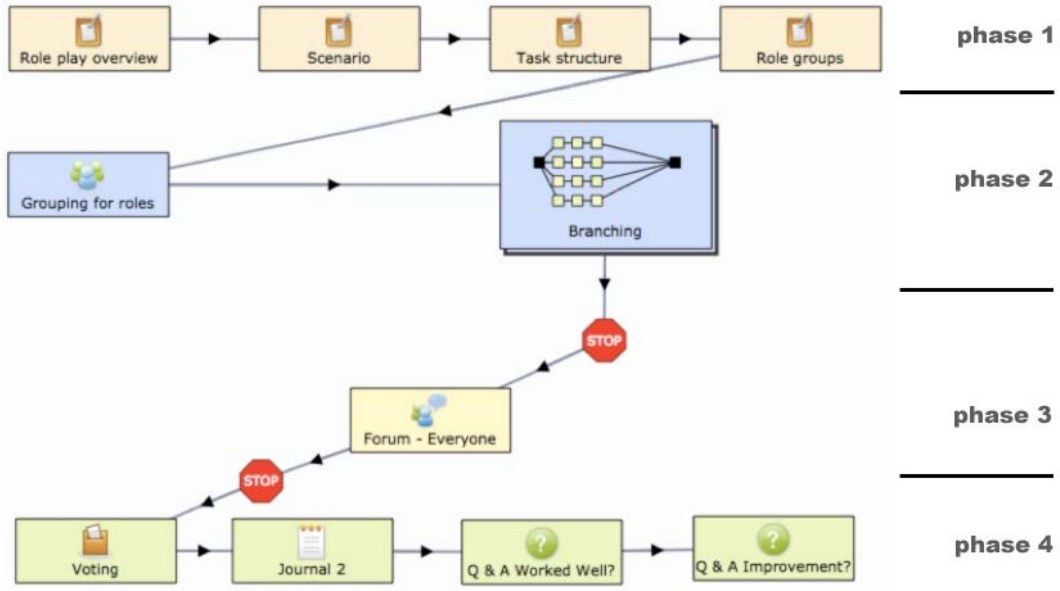

Figure 2: LAMS Authoring view of interactive whiteboards adoption Role Play, with phases added (right side).

For those familiar with LAMS, the colour and icons of each activity (i.e., each box) provides information about the type of online tool being used at each stage (e.g., information page, discussion forum, voting tool, shared question and answer). This means that the visualisation provided in Figure 2 conveys information about the structure and sequence of this learning design and the nature of individual activities within it. Double clicking on a box provides information about the content of the relevant activity and the settings for the tool.

Hence, Figure 2, together with other supporting advice, provides a description of the teaching and learning activities for this Role Play. It contains information at three levels of description – a visual representation for the sequence of learning activities (shown), a second more detailed level of instructions/content and settings within each individual tool (accessed by double clicking), and a third underlying technical description (in XML) that provides all the relevant information that a Learning Design software system needs to implement this learning design as a set of "live" activities for a group of learners (e.g., it provides the technical information about how to configure the forum for phase 3).

All of this information is contained in a single file that can be given to other educators who could then run this set of activities with their learners (given access to the appropriate Learning Design software system). This particular file is available at http://www.lamscommunity.org/lamscentral/sequence?seq_id=690433
Even if the file is not run with another group of learners, it provides information to other educators to help them understand the structure of teaching and learning activities in the Role Play, which could assist them to implement variations of this approach (whether online or face to face).

In this example, the LAMS Authoring environment provides a framework/descriptive language for notating this learning design. There are other attempts at a descriptive framework within Learning Design research (four further examples are given in the "Conceptual Map" section below). At a technical level, there have been several XML-based approaches (IMS LD, LAMS LD, Learning Design Language). At a written level, there are many types of lesson plan formats, as well as explicit Learning Design written formats such as LD_Lite (Littlejohn & Pegler, 2007). From another perspective, educational patterns can be viewed as a type of written Learning Design (McAndrew, Goodyear & Dalziel, 2006). There are also various visualisation approaches, particularly the Learning Design flow diagram from the AUTC Learning Design project. Finally, there are software systems that provide an integrated technical, "written" and visual approach, such as LAMS and COLLAGE (Hernandez-Leo et al, 2006). An example of an explicit overlap of the ideas of a Learning Design system and music notation is the "Learning Score" software developed by John Davitt and colleagues, which uses a musical score-like approach to arranging lesson activities over time. While this example is a more literal interpretation of the musical notation metaphor than is intended here, it nonetheless illustrates the power of this idea.

Each of the examples in the above paragraph is an attempt at devising a descriptive framework for teaching and learning activities that is analogous to a system for music notation. More precisely, each example is like one of the attempts at music notation prior to the development of the standard Western music notation approach – that is, it captures some aspects of the teaching and learning process, but it is not yet sufficiently comprehensive or widely adopted to become a standard for "educational notation". Figure 3 gives two examples of music notation – the example on the left predates the standard Western approach but gives glimpses of what the future will be (and hence may be analogous to Figure 2), while the example on the right is based on the standard approach that has been central to Western music notation for hundreds of years (there is no analogy to this in education – not yet).

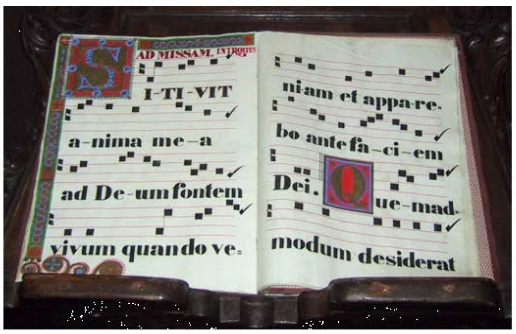

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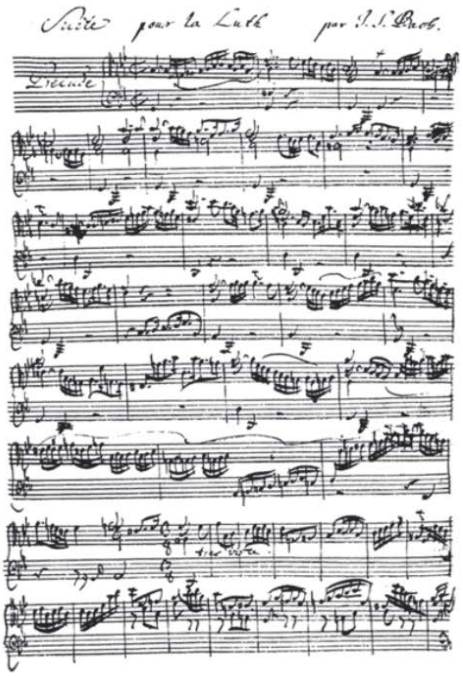
Photo by Asiir 17:00, 13 February 2007, Wikipedia.org



First page of the manuscript of Bach's lute suite in G Minor. Wikipedia.org

Figure 3: Examples of music notation from before the development of the standard Western notation tradition (left) and after its development (right).

Part 3: Definition Problems

Many in the field of Learning Design currently feel that the foundational ideas and definitions are not sufficiently clear and that there is a need to create clearer conceptual foundations in order to foster the next generation of research and development. A number of meetings of experts held over several years have wrestled with these problems without clear solutions until recently (see Acknowledgements for details).

For example, the term “Learning Design” itself has a variety of meanings. In the early days of the field there was debate over whether IMS Learning Design was “the” Learning Design or just one example of these concepts. One early attempt to resolve this difficulty was to use a capitalised “Learning Design” to refer to IMS Learning Design and a non-capitalised “learning design” to refer to the wider concept (Britain, 2004). While this idea may have been useful in the early years, it is less useful today where many researchers wish to use the capitalised format (i.e., “Learning Design”) to refer to the field as a whole, and then use “IMS Learning Design” to refer only to IMS Learning Design. We have followed this usage in this article and recommend it for the future to avoid confusion.

A related problem is that a particular sequence of teaching and learning activities that has been constructed using the ideas of Learning Design is often called “a learning design” or “a design”. While this re-use of the same words to refer to both a whole field of study and a specific instance of work can be confusing, it has become sufficiently common practice that we would recommend the phrase “a learning design” or “a design” (uncapitalised and singular) for future use. We would recommend avoiding the term “learning design” (uncapitalised) for the whole field – we recommend “Learning Design” for the whole field and “a learning design” for an instance. In some contexts the words “a sequence” are used instead of “a learning design”, although “a sequence” has the limitation that it may be taken to imply only a simple linear sequence. Nonetheless, “a sequence” is sufficiently common in some areas of Learning Design (especially those associated with LAMS) that it is worth noting as an alternative to “a learning design”.

One of the core innovations of Learning Design software systems is that a sequence of teaching and learning activities is created independent of its implementation context (i.e., independent of a class of learners), and hence it is automatically shareable and can be used in other learner contexts. It is this characteristic that most clearly illustrates how a learning design implemented in a Learning Design software system is different from a collection of learning activities inside a class/course within a Learning Management System (LMS[5]). The learning design is created from the ground up as shareable and re-usable and then later applied to a particular class; whereas the activities in the LMS are locked to a specific class of learners, and often difficult or impossible to extract in a shareable format.

In practice, this feature of Learning Design software systems means that a learning design must be applied to a particular class of learners (which may require related tasks such as setting up learner accounts or assigning learners to a sequence; assigning specific learners to groups used within a sequence, etc.). Hence, there is a need to identify the difference between a learning design as an abstract set of activities (independent of a class of learners) and a learning design that has been implemented with a specific group of learners. While there has been less discussion of this issue to date, the most common phrasing for a learning design implemented with learners is "a running learning design", or alternatively "a running sequence" – these phrases are recommended for the future. To continue the musical analogy, a running learning design is equivalent to the performance of a piece of (notated) music. Another word used to describe the implementation of learning designs is "orchestration" (Prieto-Santos, Dimitriadis & Villagrá-Sobrino, 2011). In the context of LAMS, a running sequence is also called a "lesson", but given the other connotations of this word, it is not an ideal term here.

From an educator's perspective, the creation/authoring of a learning design is different from the task of monitoring learner progress through a running learning design. From this distinction it can be noted that "evaluating" a learning design can have two (complementary) meanings. The first is that an educator could evaluate a learning design that was authored by another educator (e.g., acquired via a learning design repository). This evaluation would be based on assessing the way the activities have been constructed and the educator's opinion of their coherence and potential effectiveness – but the key issue to note is that this evaluation can be conducted independently of any data about actual learner behaviour. The second kind of evaluation is to look at learner activity data from a running version of the same learning design (or across multiple running versions of the same design where available), as this may provide additional insights into the potential effectiveness of a learning design based on learner behaviour.

The above discussion offers clarification of some existing definitional challenges within the field. At the end of this paper we will return to some broader definitional issues for the future.

Part 3.1: Pedagogical neutrality and Learning Design

While the definitional discussion above may help to clarify the meaning of key terms within the field of Learning Design, a deeper conceptual problem remains – the idea of Learning Design as a "pedagogical meta-model" (Koper, 2001), or more provocatively, that Learning Design is "pedagogically neutral".

[5] Learning Management Systems (LMSs) are sometimes called Virtual Learning Environments (VLEs)

Learning Design is not a traditional pedagogical theory like, say, constructivism. Learning Design can be viewed as a layer of abstraction above traditional pedagogical theories in that it is trying to develop a general descriptive framework that could describe many different types of teaching and learning activities (which themselves may have been based on different underlying pedagogical theories). For example, a class taught using direct instruction methods would have a different activity structure to a class taught using constructivist methods, but Learning Design seeks to provide a single notational framework that could describe both sets of activities.

It is crucial to note at this point that unlike constructivism or instructionism, Learning Design does not put forward a theory about how learners learn, and hence how teachers should teach. There is no "should" in Learning Design as a descriptive framework – merely a description of what activities happened in the classroom or online.

By comparison, music notation provides a single framework for describing many different styles of music (Classical, Romantic, Modern, etc.). A given instance of any one of these styles could be a beautiful or mediocre example of this style. Hence, Learning Design as a "pedagogical meta-model" is attempting a similar goal as music notation – a general framework for describing many different styles/pedagogies, and any given instance of a style/pedagogy could be assessed as beautiful/effective for learning or mediocre/ineffective for learning. In this sense, the descriptive aim of Learning Design is pluralism rather than neutrality.

Going further with the music notation example, no descriptive framework is absolutely neutral – even a successful, widely used framework (such as the Western music notation tradition) will have weaknesses in certain contexts (e.g., quarter-tone singing), and there are other music notation traditions that have different strengths and weaknesses in describing musical ideas. While a widely adopted system of notation will have many strengths in representing the music of its community of origin, its success as a framework is a complex mixture of accuracy and expressiveness of representation, ease of understanding and historical factors. Hence, Learning Design could never be pedagogically neutral in an absolute sense – any system of description will have certain biases in its descriptive framework.

However, we believe that given these caveats, it is possible to conceive of a framework for describing many different types of teaching and learning activities, and that this framework could appropriately aspire *towards* being pedagogically neutral, even if this goal is unachievable in an absolute sense. The practical goal is a framework of sufficient accuracy and expressiveness that it can describe many different examples of teaching and learning activities (which are themselves based on different pedagogical theories). Any given instance may be an excellent or mediocre expression of a particular underlying pedagogical theory, and hence more or less effective for student learning.

While we believe that the phrase "pedagogical neutrality" can be useful as a debating point for illustrating how Learning Design is different to traditional pedagogical theories, in practice we prefer phrasing such as "Learning Design frameworks can describe a broad range of teaching and learning activities" so as to avoid unnecessary consternation among colleagues who experience visceral reactions to "pedagogical neutrality". Hence, we recommend the less provocative formulations for future general purpose discussion of Learning Design, while acknowledging the occasional use of the more provocative form in the narrow case of debates that compare Learning Design to traditional pedagogical theories.

Part 4: A Learning Design Conceptual Map

Descriptive frameworks for teaching and learning activities are one of the core innovations of Learning Design, but there are many related issues. Any particular representation of a learning design can also include advice about the design, including advice about how the design was created (and hence how it could be changed) and also advice about implementing the design with learners. Another central element is that of sharing – as the reason for describing good teaching ideas is to propagate these ideas among educators, in order to ultimately improve teaching and learning widely.

But even these core concepts are only a small part of the wider field of Learning Design. In Figure 4 we have tried to capture the broader education landscape and how it relates to the core concepts of Learning Design. We have called this a Learning Design Conceptual Map (LD-CM). For the sake of clarity, we refer to a box in the LD-CM as a "component" and an item within a box as an "element".

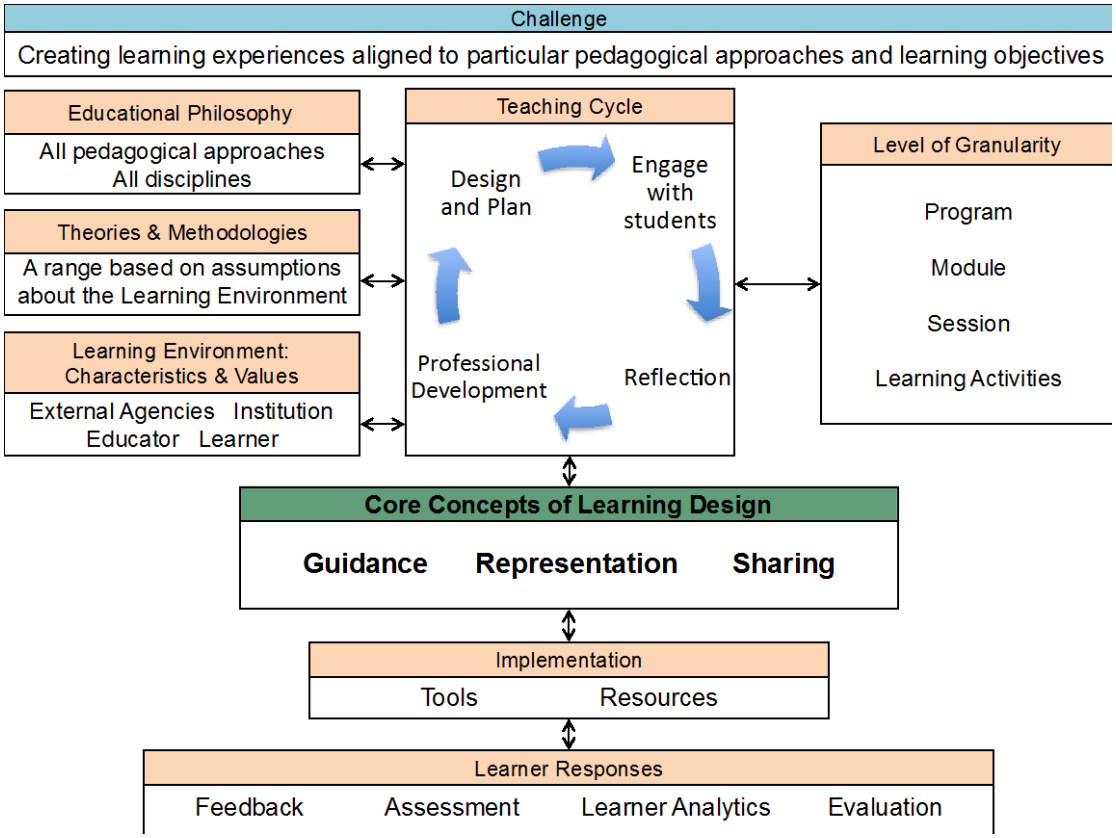


Figure 4: A Learning Design Conceptual Map

The arrows provide one view of how the different elements interact in the process of designing and implementing teaching and learning activities, but there are other interactions both within and between the elements of the LD-CM – however, to attempt to note all possible arrows would make the Map unwieldy. But this is not to discount the importance of other connections between parts of the Map, for example, an arrow from Learner Responses to Educational Philosophy could indicate the ways in which learner responses to learning experiences can shape the educational philosophy of an educator, and how this could change how an educator designs future learning experiences.

Challenge

Our overall statement of the challenge is “creating learning experiences aligned to particular pedagogical values and objectives”. Just as the Learning Design descriptive framework seeks to support many different pedagogical approaches, we have similarly tried to phrase our vision of the general educational challenge in a way that is applicable to many different contexts regardless of the particular pedagogical approaches of that context.

In practice, the actual pedagogical approaches and learning objectives will be determined by the Characteristics and Values of institutions, external agencies and educators (and indirectly, learners), together with the relevant Educational Philosophy and Theories and Methodology that are appropriate for a given educational context. Hence the top left section of the LD-CM provides a structure for analysing the broader educational context and how it impacts on representations of teaching and learning activities – these three components are discussed below.

We note that some approaches to education sector transformation start with an assumption that educators need to be “fixed” or even in some technology discussions, “removed”. By comparison, the field of Learning Design focuses on educators creating great teaching ideas and sharing these with their colleagues, who in turn adapt these ideas to suit their local teaching context, and potentially share back adapted or improved versions of the original idea. While a shared learning design might be used “as is” if it is a perfect fit for the local context, the usual expectation is that an educator who adopts a learning design will still need to adapt it to suit the particular needs of his/her learners. Hence the re-use of learning design is not a mechanical implementation process, but rather a creative process where educators use professional judgement to align a good teaching idea from elsewhere with the unique needs of their context. Going further, this implies that Learning Design software should empower a typical educator to easily edit a learning design, rather than requiring specialist technical skills or assistance from technical staff.

Educators are central to Learning Design as creators, sharers, adapters and improvisers, working together in professional communities of practice. As a model of education sector transformation, it is a model led by educators for educators.

Educational Philosophy

This component of the Learning Design Conceptual Map is to note the explicit or implicit pedagogical theories that underlie decisions about teaching and learning. This most often has an impact via the choices of educators, but policy decisions at higher levels (such as educational institutions and external agencies such as government education departments or professional bodies) can also affect educational philosophy. For example, university degree validation documents often require statements regarding the educational approach taken to the design and delivery of courses, and these may be influenced by policy and strategy.

Some examples of pedagogical theories include constructivist approaches, cognitive and developmental approaches, instructionism/drill and practice-style approaches, connectivist approaches and others. More detailed discussion of pedagogical theories, effective teaching and Learning Design is provided at the end of this paper.

This component also notes that Learning Design is applicable to all discipline areas. While the structure of particular learning designs may vary from discipline to discipline, the underlying concepts of Learning Design are relevant to all content domains.

Theories and Methodologies

There are a wide range of theories and research methods that are used to guide decisions about teaching and learning activities, as well as to evaluate the impact of those decisions. This includes theories about how people interact, about how institutions affect people's behaviour, theories of motivation and incentives, etc. These include theories such as Cultural-Historical Activity Theory, Communities of Practice, Actor-Network Theory and Cybernetics and Systems Thinking (see Conole, 2013, for a review of these theories in relation to Learning Design).

Most importantly, there are many different types of research methods used in education, including quantitative and qualitative research, action research, design-based research, experimental control studies, case studies, ethnography, etc. Differences in research methods lead to different kinds of evidence for educational effectiveness, which in turn is used to support different kinds of pedagogical approaches, which ultimately affects the day-to-day decision-making of educators, and the policy directions of educational institutions.

Learning Environment: Characteristics and Values

This component of the Learning Design Conceptual Map can be used to describe how the context for learning affects the design of teaching and learning activities. The title draws attention to how both the characteristics and values of external agencies (such as government and professional bodies), institutions, educators and learners are relevant to understanding an educational context.

An educational institution can have formal education structures and accreditation (e.g., a university degree), or it may have more informal structures (e.g., a community learning group such as computer skills for older people). For example, a university's focus on knowledge testing in formal exams in order to pass courses for a degree differs from a focus on practical abilities/competencies, such as the ability to use a computer where there is no external assessment/certification. Explicit and implicit moral, political and spiritual values can have an impact on a given learning environment via educational institutions, as well as via educators and learners. In addition, institutional characteristics include the physical and virtual environments available for teaching and learning. The institution's characteristics and values typically impact teaching and learning through affordances and constraints on the behaviour of educators and learners.

Educational institutions rarely have complete freedom to allow educators to teach as they wish – it is more common for institutions to be affected by external agencies that constrain and direct their teaching, be it government education departments or industry and professional bodies. It is not unusual for institutions to be affected by many different external agencies, and the complexity of overlapping constraints and directions from multiple agencies is one of the growing modern pressures on institutions and educators.

Educators bring different characteristics and values to their decision-making about teaching and learning activities. This includes the quantity, and style, of teacher training that has been received, past experiences as a learner, the kind of classroom/online teaching experience of an educator, the role of other educators as peers and mentors, the self-perception of the educator's role as expert/facilitator/provocateur, the educator's values about the kind of learning that is important (and unimportant) for his/her learners, etc.

Learner characteristics and values include responses to teaching and learning activities (e.g., whether learners are comfortable with debate, or questioning the ideas of their teachers), their past learning experiences and how they shape current behaviour, their own values about what matters (and what doesn't) in their education, their levels of motivation and engagement, their goals for their future, etc. These characteristics operate not only at the individual level, but also in larger clusters, such as the "student culture" of a particular class or a whole educational institution, and also wider cultural approaches to education, such as national attitudes.

Of particular importance to recent educational reforms are the learner characteristics of developing graduate attributes/21st Century skills, such as critical thinking, teamwork, communication, inter-cultural understanding and creativity. A related skill is the development of critical reflection on life and work with digital technologies – often referred to as digital literacies – and the wider range of digital responses that learners can produce in today's world, such as creating a presentation, a website or a movie, rather than simply writing text for an essay.

There are many complex interactions among external agencies, institutions, educators and learners in terms of characteristics and values. For our current purposes, it is simply worth noting that different assumptions within this part of the LD-CM will have different impacts on how teaching and learning activities are planned and delivered, and how learners respond to these activities.

Teaching Cycle

This component of the LD-CM acknowledges how different stages in the Teaching Cycle can impact on the design of teaching and learning activities. Obviously, how an educator designs and plans a set of activities is crucially important, and this is a central focus of Learning Design. But the LD-CM also draws attention to how educators engage with learners, such as adapting their teaching "in the moment" to the changing dynamics of the classroom, or responding asynchronously to learners in an online discussion forum. Indeed, one of the most frequent concerns about online education is the loss of non-verbal cues about learner reactions to teaching that otherwise inform adaptation "in the moment". This example draws attention to the more general issue of how the act of teaching sometimes plays out differently to how it was planned beforehand.

The dimension of adaptation or improvisation of teaching "in the moment" has been weak in Learning Design to date, particularly where Learning Design software systems struggle to change a sequence once it is running. However, any current technical difficulties in coping with this requirement should be of secondary importance – the skills and techniques that educators bring to adaptation "in the moment" are of great importance to teaching and learning. It is worth drawing attention to this historical weakness in Learning Design, as the ability to adapt teaching in the moment is central to the self-image of many educators, and hence a perceived lack of emphasis on this aspect of teaching and learning has led some educators to dismiss Learning Design in the past.

Reflection on teaching during and after the event is also of significant importance to future design decisions – understanding what went wrong in an unsuccessful class can change planning in the future. A more long-term view of this process of reflecting on teaching is captured in the "Professional Development" element, also sometimes called "Professional Learning", which would contain both formal Professional Development courses as well as the long personal journey of gaining experience as an educator, and how this influences subsequent Teaching Cycles of designing and engaging with learners.

Level of Granularity

This component of the LD-CM illustrates different levels of granularity in the design of teaching and learning activities, such as how individual Learning Activities build up to sequences or Sessions. Collections of Sessions over time make up larger Modules (like courses), and Modules often combine to larger Programs of learning, such as a degree or a year (or set of years) of school education.

These distinctions will at times have fuzzy boundaries and different terminology (particularly across different education sectors – e.g., universities versus schools), but the important issue for this Map is that different kinds of decisions are typically made at each level. Individual Learning Activities involve decisions such as the phrasing of a reflective question (e.g., open or closed), the layout of an online resource and the structure of quiz items.

Sessions tend to be collections of activities (be they sequential or other non-linear structures), with the key focus being the learning objectives(s) of a set of activities, and the rationale for the choice and arrangement of Learning Activities to achieve this objective. Many innovative teaching strategies, such as Role Plays, Problem-Based Learning, Predict-Observe-Explain, WebQuests, etc., are sets of Learning Activities that have a particular sequential structure.

Decisions at the Module level relate to how Sessions relate to a larger unit – such as how the weekly Sessions of lectures and tutorials are structured to cover the content of a course in a typical university setting, or how a set of different sequences of Learning Activities contribute to a larger unit of work over a number of weeks/months in a school. Program level decisions often include high-level progression concepts, such as course pathways within degrees (and their prerequisites), or the structure of Modules over a year in a school. It is also worth noting that broad learning objectives at Program and Module levels (such as 21st century skills) may cascade down into particular learning objectives at the level of Sessions and Learning Activities.

Core Concepts

At the heart of the LD-CM are the core concepts of Learning Design – most centrally the idea of a descriptive framework for representation and visualisation of teaching and learning activities – "educational notation". This element is complemented by guidance and sharing.

Guidance
Guidance covers the many ways that educators can be assisted to think through their teaching and learning decision-making, in particular, how they can understand and adopt new, effective teaching methods. In some cases guidance is incorporated into the representation (e.g., patterns), whereas in others it is a complement to the representation, for example:

- websites with information on teaching ideas and tools (e.g., the Phoebe Pedagogic Planner, Masterman & Manton, 2011),
- software systems that seek to guide educators through a reflective process about their teaching (e.g., the London Planner/Learning Designer), potentially including artificial intelligence to offer suggestions during the process,
- collections of templates of effective teaching strategies and accompanying advice (e.g., LAMS Activity Planner),
- workshop processes for guiding groups of educators in reflective planning of future teaching (e.g., Viewpoints project, Open University Learning Design Initiative), and
- formal teacher training/professional development.

Given the focus of the field of Learning Design on sharing and re-use, an important aspect of guidance is information to accompany any shared learning design about its context of use, and how it might be adapted for another context. This may include metadata about the learning design, covering issues such as the educational context of its original use (e.g., discipline, age group, timeframe, country, etc.), its learning objectives and pedagogical rationale, past implementation experiences with learners, suggestions for adaptation and so on. The point is to provide sufficient guidance to aid in local implementation when an educator considers using/adapting a learning design from another context. Further details about processes of sharing are given in the Sharing section below.

Representation
As noted above in relation to Figure 3, the field of Learning Design is yet to develop a widely accepted framework for representation of teaching and learning activities. However, aspects of a number of projects provide indications of how this framework might be conceptualised. Figure 2 provides an example from the LAMS Authoring environment that draws attention to the flow of different kinds of learning activities over time in a visual format. Another example of a visual format for illustrating the flow of activities over time is the flow diagram from the AUTC Learning Design project – Figure 5 provides an example of

this diagram for describing a “Predict – Observe – Explain” teaching method (AUTC Learning Design, 2002).

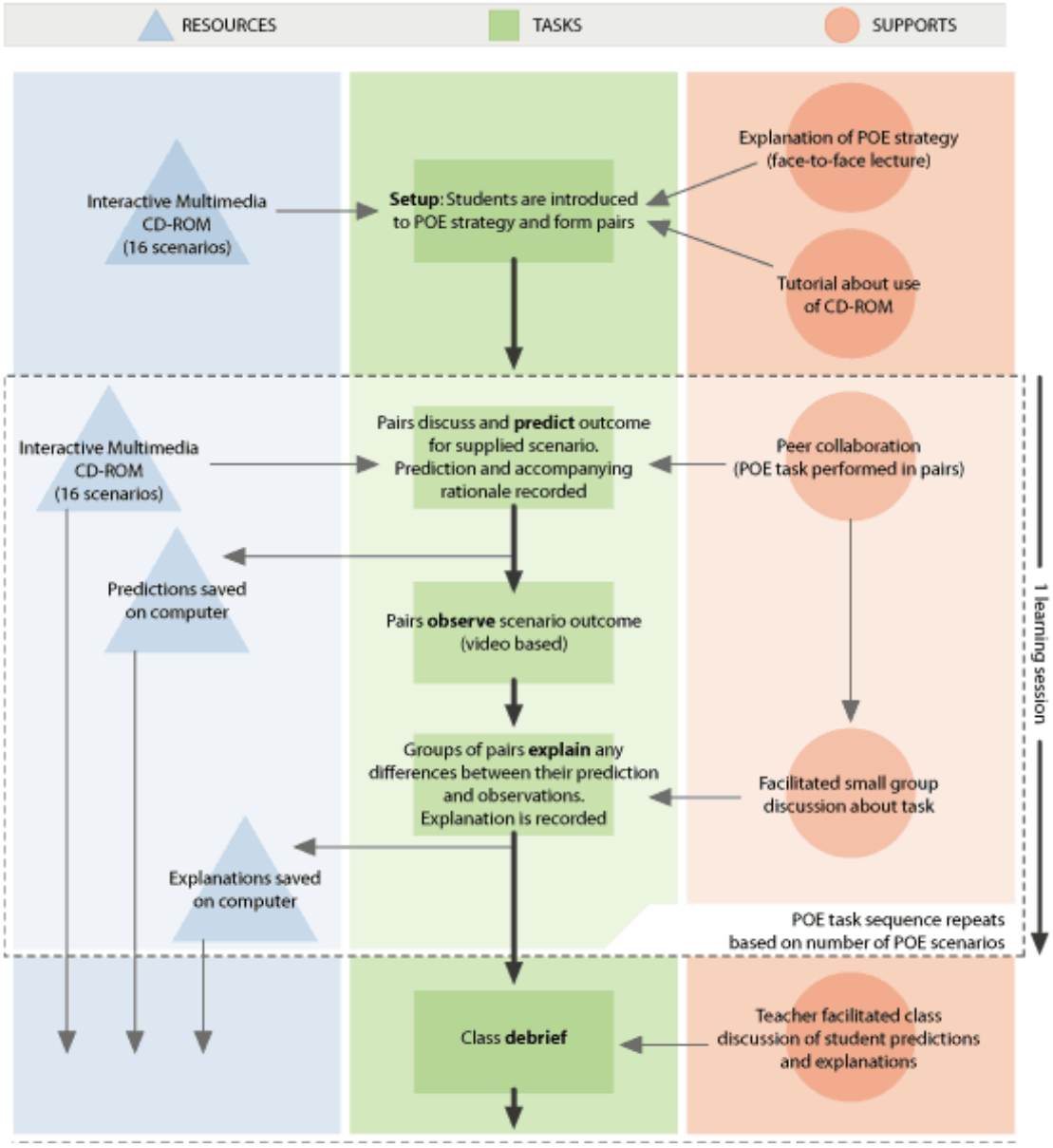


Figure 5: A “Predict – Observe – Explain” teaching method described using the AUTC Learning Design project flow diagram.

Another kind of representation is educational patterns, drawing on research on patterns in disciplines such as architecture and software development. Patterns use a particular form of structured text, and may also include a visualisation, such as the example in Figure 6 for a jigsaw teaching method (from Dimitriadis, 2012).

Pattern 1.1 JIGSAW **

… within a collaborative learning scenario in which SCRIPTED COLLABORATION (pattern 11 from (E-LEN, 2005)) is seen as a remedy for situations where free collaboration does not lead to learning, it may be necessary to plan how groups will perform a set interrelated activities. This pattern gives the organization of a collaborative learning flow for a context in which several small groups are facing the study of a lot of information for the resolution of the same problem.

***

If groups of students face resolution of a complex problem/task that can be easily divided into sections or independent sub-problems, an adequate collaborative learning flow may be planned.

The flow of collaborative learning activities to be followed in order to solve a complex divisible task should promote the following educational benefits (Aronson & Thibodeau, 1992; Clarke, 1994; Johnson & Johnson, 1999):

- To promote the feeling that team members need each other to succeed (positive interdependence)
- To foster discussion in order to construct students' knowledge
- To ensure that students must contribute their fare share (individual accountability)

However, the solution for structuring collaboration in order to tackle this problem may be complex and probably more appropriate for collaborative learning experienced teachers and learners. It may be best suited for the end of the semester when the students are comfortable with group work.
Therefore:

Structure the learning flow so that each student (individual or initial group) in a group ("Jigsaw Group") studies or work around a particular sub-problem. Then, encourage the students of different groups who study the same problem meet in an "Expert Group" for exchanging ideas. These temporary focus groups become experts in the section of the problem given to them. At last, students of each "Jigsaw group" meet to contribute with its "expertise" in order to solve the whole problem.

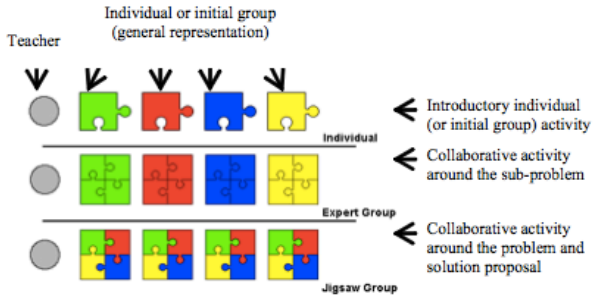


Figure 6: Part of a jigsaw teaching method described using an educational pattern (NB: not shown are sections at the end of this pattern for "Patterns that complement this pattern" and "Patterns that complete this pattern").

A fourth kind of representation is the timeline and pie chart views in the Learning Designer (previously named the London Planner). In this representation, the learning activities are analysed in terms of the type of learning that occurs in each activity (including the potential for multiple types of learning to occur in one activity). This approach is based on a conceptual classification of types of learning into five categories (also known as pedagogic descriptors): Acquisition, Discussion, Inquiry, Practice and Production. This approach allows for computational analysis of the types of learning occurring across learning activities (as opposed to analysis of simply the type of digital tools selected, as with LAMS). This is a promising area for future Learning Design research if agreement on a set of pedagogical descriptors can be achieved. Figure 7 is based on an example about evaluating energy use from Bower, Craft, Laurillard and Masterman (2011).

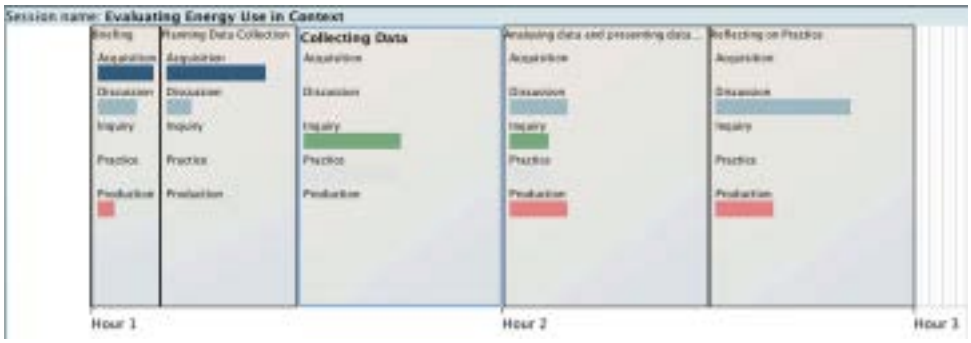


Figure 7: Timeline and pie chart views of analysis of learning activities in the Learning Designer for a sequence on evaluating energy use.

A final, different example of a representational approach is the Open University Learning Design Initiative (OULDI) "Course Map" view (see Conole, 2012), which is a representation primarily at the "Module" Level of Granularity (as compared to the previous four examples, which were primarily at the Learning Activities and Session levels). This representation draws attention to the components of an overall university course/unit, and how tools/resources and roles/relationships relate to the different course aspects of Guidance and Support, Content and Experience, Reflection and Demonstration and Communication and Collaboration. It does not describe sequences of activities like earlier examples (activities are described elsewhere in the OULDI approach, including some similar ideas to Figure 7) – instead, it provides a more holistic view of different types of activities across the whole unit/course – see Figure 8.

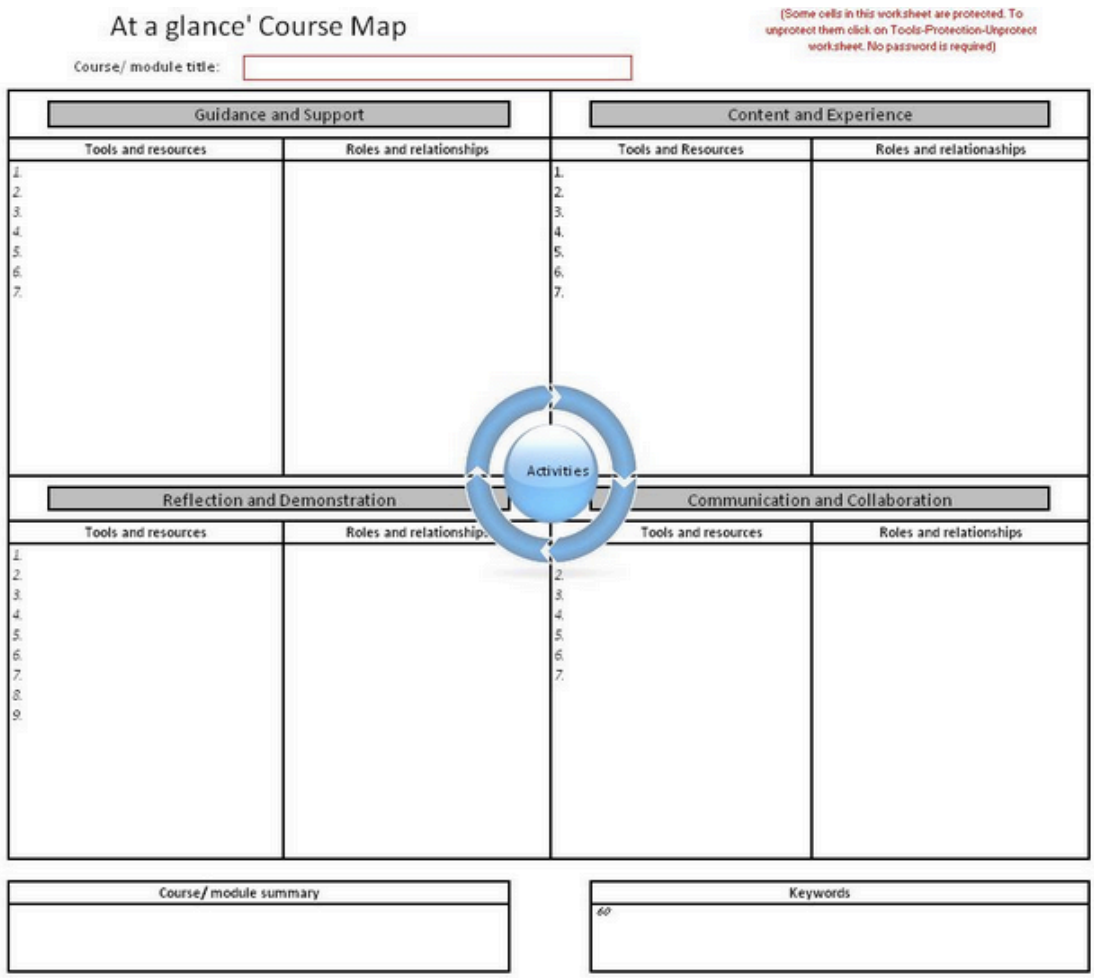


Figure 8: Course Map template (empty) from the Open University Learning Design Initiative.

Before leaving this section, two additional points are worth making. First, an interesting difference between patterns and a software-based learning design (such as a LAMS sequence) is that a pattern provides ideas/guidance for a teaching method, but how these ideas are used in practice still requires a "creative leap" by the educator; whereas a LAMS sequence (if it contains relevant content) could potentially be used "as is" – no creative leap may be needed. There are potential benefits and challenges in each case – a pattern requires significant additional work for implementation, but this work should help to ensure the pattern is appropriate to the immediate learner context; a LAMS sequence with relevant content could rapidly be used as is, but if it is used without sufficient regard for the immediate context, a pre-built sequence from another context may not be a good match for local learner needs. The normal expectation would be that any re-use of a learning design requires careful professional judgement by an educator to determine how best to adapt and then implement a teaching idea to suit the local context.

Second, there is a tension between the extent to which a descriptive framework rapidly conveys the essential teaching idea(s) of a learning design compared to conveying the detailed teaching and technical information needed for implementation ("orchestration"). This can be described as a tension between "beauty and precision" in descriptive languages (Derntl, Parrish & Botturi, 2010).

In summary, Learning Design projects have developed a number of different ways to represent/visualise teaching and learning activities that hopefully provide a glimpse of a future widely adopted framework for educational notation. It may be that a single dominant representation will be widely adopted in the future (as in Western music notation) or it may be that multiple diagram types will be needed (such in the Unified Modelling Language in software development). It may even be that new technologies, such as animations, will

provide new approaches to representation that do not have a simple written analog. For a promising early example of this idea, which uses animations to represent assessment information across a semester at a Module and Program level, see the "Map My Programme" project (Walker & Kerrigan-Holt, 2012).

Sharing
The "Sharing" element draws attention to the driver behind representation – the propagation of good teaching ideas from one educator to another. Learning Design has a strong history of sharing, including the use of online repositories of learning designs (e.g., the LAMS Community) and communities for discussion of teaching ideas among peers (e.g., Cloudworks). Sharing in Learning Design is often under open educational licenses (such as Creative Commons licenses), and hence is part of the wider movement of Open Education, and related movements in open source software and open content.

Indeed, a case can be made that Learning Design is "open source teaching", in the sense that the open sharing of descriptions of teaching activities is like sharing the "source code" of teaching, and where these ideas are developed and improved over time by communities of educators, then there is genuine argument for the phrase "open source teaching". And this idea supports one of the striking possibilities of Learning Design – the potential to take teaching strategies from one discipline (e.g., PBL in medicine) and propagate them to other disciplines by capturing the underlying pedagogic essence of the teaching strategy in a learning design (separate from any discipline content) in order to explore the potential use of this teaching strategy in a different discipline context.

An agreed representation is only one part of the complex phenomenon of sharing – there are many social forces at work that foster and inhibit sharing. By comparison, the adoption of music notation was driven not only by its conceptual elegance and usefulness, but also through social practices of music teaching using the notation, as well as informal networks among musicians who propagated this notational approach when it first appeared. Similarly, any widespread acceptance of an educational notation system will arise from a complex mixture of usefulness, social propagation and serendipity. More research is needed on the factors that foster, and inhibit, practical sharing of learning designs.

Implementation

This component of the Learning Design Conceptual Map draws attention to different Tools and Resources that are required during teaching. This could include physical tools for classroom activities (whiteboard, flipchart, pens) as well as educational resources such as articles and videos. In online contexts, activities may require tools such as discussion forums, wikis, quiz systems, etc., and resources such as websites and online videos.

In the case of Learning Design software systems, activity tools are a part of the overall software. A special feature of activity tools in Learning Design software systems is that they need to be capable of being configured by a learning design. That is, when an educator obtains a learning design file, and implements it in a local course, the file contains technical instructions to the Learning Design software system about how to configure the various tools required (e.g., at step 3, provide a discussion forum with two threads, with the discussion topic for thread 1 as "How is X similar to Y?" and thread 2 as "How is X different from Y?").

This requirement for Tools to be capable of receiving "injection" of external content and configurations from a learning design file has proved a far more demanding technical requirement for Learning Design software systems than was initially anticipated, and is one of the reasons for difficulties in creating fully functional Learning Design software systems.

A related requirement is the need for a sequencing engine to facilitate the progress of learners through a suite of activities, and for activity tools to be "sequencing aware" – that is, to be able to designate completion of an activity to a sequencing engine in order to allow

for learner progress through a sequence. As noted earlier, this should not be taken to mean only simple linear sequences – systems such as LAMS provide features for multiple pathways and set of activities which can be completed in any order and which can be revisited multiple times. These demanding technical capabilities are absent from most (if not all) current Learning Management Systems, which helps explain the need for separate Learning Design software systems (which can then be integrated into LMSs).

Learner Responses

We have chosen the title "Learner Responses" to capture many different types of information about student learning, such as learning outcomes, competencies, skills and understanding. While formative and summative Assessments are typical in many educational contexts (and the wider literature on these topics is all relevant here), Learning Design draws attention to a wider view of responses from learners. This includes Feedback, such as the real-time learner reactions to teaching that an educator may use to change teaching "in the moment" (see Teaching Cycle above). It also includes more structured Evaluation of teaching, such as course surveys, which may play an important role in future improvements to teaching practice.

But Learning Design software systems provide an opportunity for deeper tracking of learner activity, as every step for every learner is recorded as a by-product of the use of technology to manage the sequence of activities. This includes not just learner responses to activities but also time taken on each activity. This allows for a richer analysis of learner behaviour at all stages of the teaching and learning process, rather than just at points of assessment, or simply counting the number of mouse clicks of a learner within a LMS course. It also allows richer comparisons within a group of learners (e.g., what are the final quiz scores of learners who spent above average time in the discussion forum?). This dimension of Learning Design allows for rich Learner Analytics based on a new kind of "big data", and this illustrates how big data about collaborative learning could be used to extend the current approaches to massive open online courses (MOOCs). It could also help to avoid one of the current pitfalls of Learner Analytics research where the outcome of data analysis is simply the "discovery" of the pattern of activities that constituted the educator's lesson plan in the first place. In Learning Design software systems, the structure of activities is embedded with the learner analytics data, allowing for more profitable uses of this data for educational research.

As with Assessment, the wide literature on formative and summative Evaluation is relevant to Learning Design. A perspective on evaluation of special relevance to Learning Design is that learners are increasingly interested in the teaching methods used in their courses, and some will intentionally choose courses and institutions that use (or do not use) certain teaching methods (such as Problem Based Learning in medicine). The willingness of learners to make choices about their future study based on their evaluation of different learning designs across courses or institutions illustrates that it is not only the evaluation of learning designs by educators that will affect future decision-making – learner evaluations of learning designs will increasingly affect the decision-making of institutions and educators.

Part 4.1: Applying the Learning Design Conceptual Map to educational theory and practice

The Learning Design Conceptual Map provides a wider educational context for Learning Design representations, but it can also be used to explore how other educational theories/practices relate to Learning Design, and to each other. While a thorough discussion of any one of the following examples would require more space than is available here, we provide some initial indications of how different theories/practices can be conceived of as "overlays" onto the LD-CM.

For example, Diana Laurillard's "Conversational Framework" (Laurillard, 2002) is a model for understanding how educators and learners interact in terms of understanding a discipline's

theory as well as practical tasks. The model focuses on interactions between educators and learners at both theory and practice levels, and also how learners reflect on theory and practice internally, as well as how educators reflect on their teaching of theory and practice as a result of their interactions with learners.

In the context of the LD-CM, a given instance of teaching using Laurillard's Conversational Framework could be notated using a Learning Design representation. This could be accompanied by guidance for educators on using the Conversational Framework in this instance of teaching, and sharing of this instance with others. More broadly, the Conversational Framework has a particular focus on several elements of the LD-CM: Sessions and Learning Activities within Level of Application; Reactions to teaching and potentially Assessment in Learner Responses; and particularly the Teaching Cycle where Engaging with Learners and Reflection are affected by interactions with learners (in both theory and practical areas of the relevant discipline). Many more comments could be made about the Conversational Framework and the Learning Design Conceptual Map, but for current purposes, the point is to draw out how particular parts of the Map are significant for the Conversational Framework.

A different example is the "TPACK" Framework (Koehler & Mishra, 2009) about the technological, pedagogical and content knowledge used by educators when they design learning activities. Teaching based on the TPACK Framework could be described using the LD-CM, e.g., the level of application would be primarily at the Module and Learning Activity levels, and while the whole Teaching Cycle is relevant, there would be a greater focus on a longer-term process of professional development in understanding the TPACK Framework. As TPACK places a particular emphasis on technology, it would also focus on the way that Tools are used within the Implementation component, and differences in how educators use technological tools according to their technological knowledge.

A more challenging example to consider is the broad field of Instructional Design. Some examples of instructional design tend to focus mostly at the Learning Activity level, together with some focus on Sessions in terms of the sequencing of Learning Activities. But the underlying meaning of teaching and learning here can be quite different to the previous two examples, as some Instructional Design approaches only address single-learner contexts where no peers or educators are present (e.g., the Shareable Content Object Reference Model – SCORM – technical standard that is the basis of much e-learning courseware). SCORM constrains the type of activities that are possible (e.g., no collaborative activities), which would affect the nature of the representation as well as the choice of tools. The Teaching Cycle looks quite different for SCORM courseware, as there is no educator present in the teaching step, so all decisions are made during preparation. Changes for the future are possible based on Learner Responses, but these are typically limited to assessment such as quiz scores, and in some cases more advanced learner analytics such as time on task and cursor movements on screen.

Perhaps most significantly for a single-learner Instructional Design approach such as SCORM, it tends to have a different set of pedagogical assumptions, together with a focus on different kinds of research data to support these pedagogical assumptions. There is a need for a deeper exploration of how Learning Design relates to Instructional Design, and we hope that research on descriptive frameworks together with the LD-CM can assist in describing connections and differences between Learning Design and Instructional Design – there is much work yet to be done. Ultimately, we believe that Instructional Design is one subset of the possibilities covered by Learning Design, although it is also worth noting that Instructional Design has a more developed set of theory and practices than Learning Design at the current time.

There are many other educational theories and practices that could be analysed using the Learning Design Conceptual Map, and it may be that some of these will draw attention to significant omissions from the LD-CM, leading to an evolution of the LD-CM in the future. For our present purposes, though, we seek to illustrate how a given theory or practice can

be analysed as an "overlay" onto the LD-CM, and how different overlays can be compared to each other to better understand their similarities and differences. This approach of visualising overlays to the LD-CM is illustrated in Figure 9 by highlighting areas of particular significance within the LD-CM for Laurillard's Conversational Framework compared to areas of significance for SCORM in Figure 10. Where two overlays regard the same area as significant (e.g. Education Philosophy and Tools in Figures 9 and 10), it is important to investigate similarities and differences in how this area is interpreted in each approach.

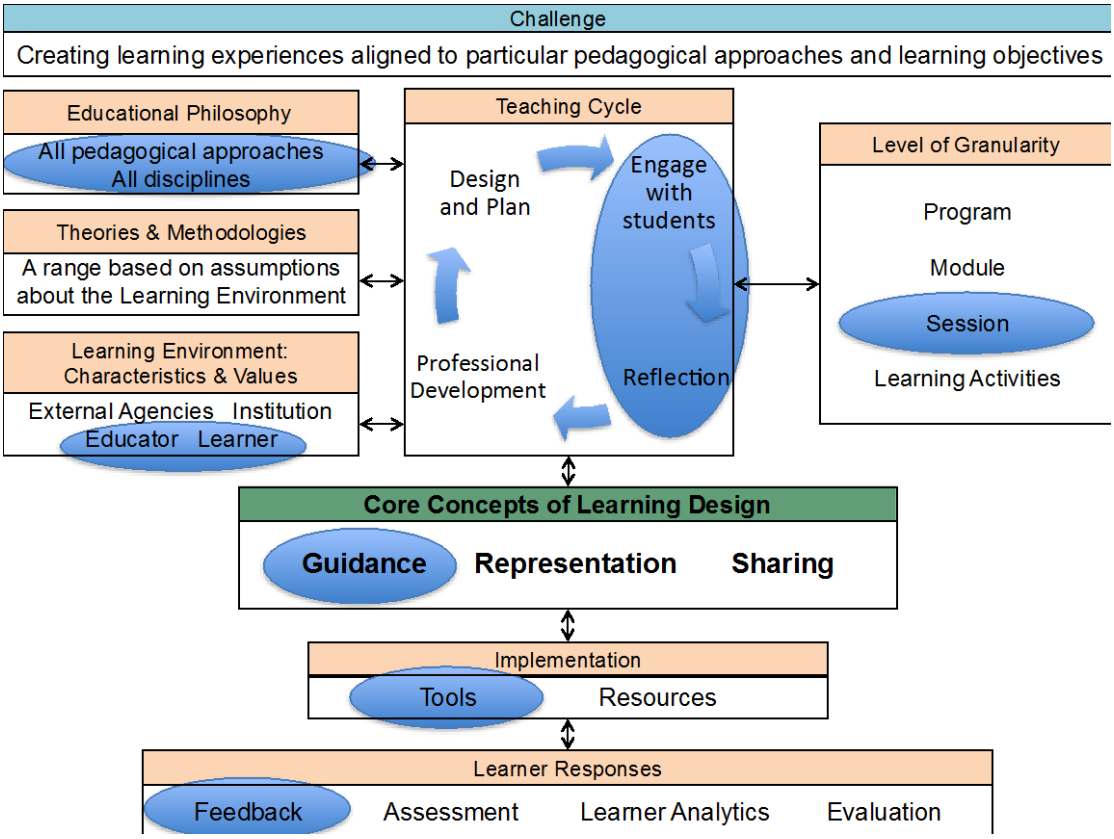


Figure 9: Example of LD-CM overlay for significant areas of interest in Laurillard's Conversational Framework (for comparison with Figure 10)

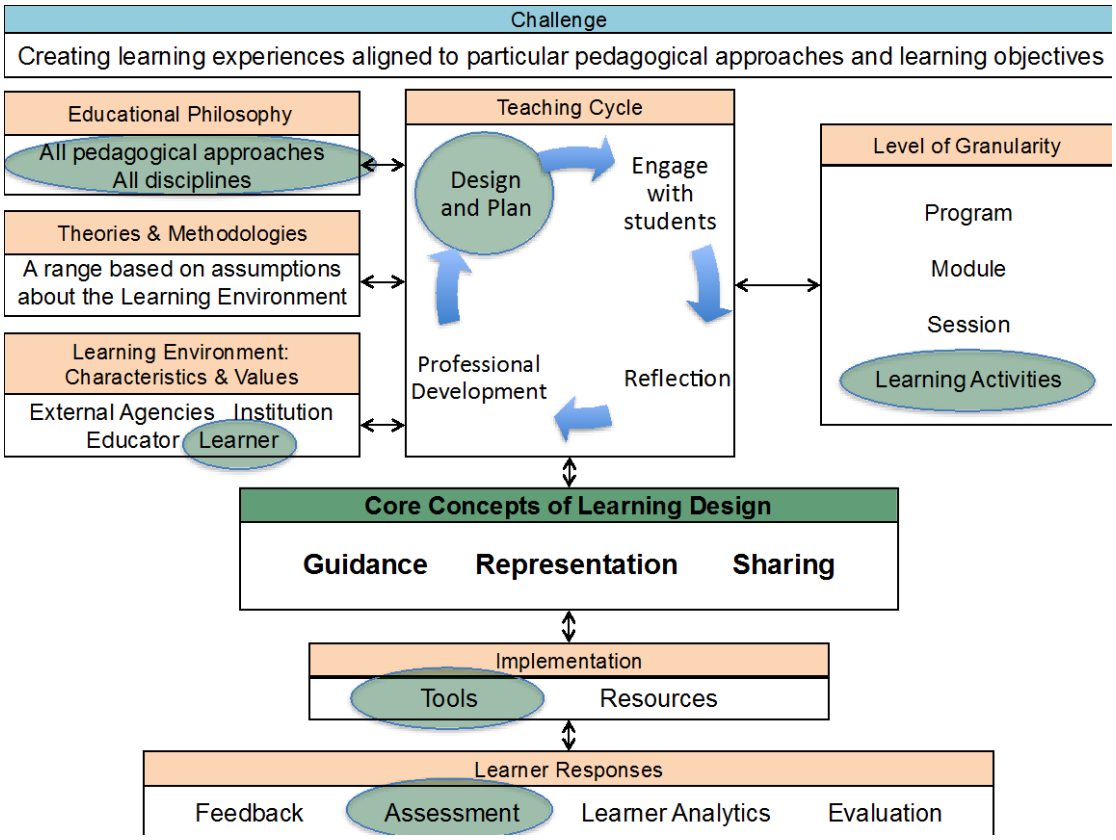


Figure 10: Example of LD-CM overlay for significant areas of interest for a SCORM single-learner courseware approach (for comparison with Figure 9).

We believe these comparisons will also benefit from using a Learning Design representation of one or more concrete instances of teaching and learning activities (based on the given theory/practice) in order to better explicate similarities and differences in classroom practices arising from theoretical differences. The combination of broad analysis of pedagogical approaches (using LD-CM overlays) combined with detailed analysis of concrete examples of teaching and learning (using a Learning Design framework) will foster clearer understanding of differences in theory and practice in education.

Part 5: Learning Design and Pedagogical Theories

Having earlier dealt with the narrow question of pedagogical neutrality, and then provided a conceptual map of the broader landscape for Learning Design, it is worth returning to the thorny question of pedagogical theories and Learning Design. A notational framework for describing examples of many different pedagogical approaches may be of interest to a small audience of theoreticians who are fascinated by the challenge of abstract representation. However, the great majority of educators would be interested in a descriptive framework in order to help them teach *more effectively*.

By comparison, it would be possible to notate almost any musical performance (no matter how unpleasant), but few people would be interested in this notation purely as a challenge to the capabilities of the notation system. Rather, writing down musical ideas is a way to convey great music from one person to another over time and space. An abstract framework for notation is itself of little interest to most musicians – what matters is what it conveys, not how it does it. We remember the names of great composers, not the names of those who developed music notation.

The ultimate rationale for Learning Design is that it can convey great teaching ideas among educators in order that learners may learn more effectively. This improved learning arises from their educators adopting new, effective teaching strategies for designing learning experiences.

The conceptual difficulty is that the Learning Design framework tries to avoid privileging any particular pedagogical theory over another in its notational system, and yet almost all educators who could use Learning Design would wish to use it to improve learning, and improving learning requires a theory of how students learn.

We propose two ways to approach this problem. In the first approach, we have provided a Learning Design Conceptual Map to help explore the relationships among the "moving parts" of how an educator comes to teach in a particular way at a particular moment. The LD-CM provides a way for approaching this question that focuses on the core Learning Design concepts (guidance, representation and sharing) but also draws attention to the many related issues that affect the decision-making of educators.

Given a particular instance of teaching and learning, the LD-CM can be used to investigate how assumptions about theory and the learning environment relate to teaching plans, classroom activities and learner responses. In broad terms, it is a question of the internal coherence of actions within a given set of pedagogical (and other) assumptions. As everyday teaching is littered with examples that lack this kind of coherence, it is not an insignificant issue.

However, this first approach is, in part, a fudge. A thoroughgoing relativist interpretation might say that internal coherence is the *only* question that could be asked, as there is no "reality" by which to externally judge questions of teaching and learning effectiveness. However, the vast majority of educators believe there are more and less effective ways of teaching, arising from their observations of learner responses and the findings of educational research. In addition, most pedagogical theories ultimately contain ideas about how an educator "should" and "should not" go about teaching, which belies a view about reality (otherwise there would be no "should").

Our second approach starts by using the Learning Design Conceptual Map, where a chosen pedagogical approach can be described in the Educational Philosophy box. This choice is, ultimately, informed by evidence from the Theories and Methodologies box immediately below it, which deals with evidence from educational research. Different kinds of research evidence frequently provide support for different pedagogical theories – for example, quantitative analysis of small activities might be used to support particular types of direct instruction theories, whereas broad qualitative analyses of the skills of learners on reaching the end of their education might be used to support constructivist theories.

This is not the place for a debate over the validity of different pedagogical theories and their underlying evidence. Rather, we seek to use the LD-CM to draw attention to the way that different kinds of research evidence inform different pedagogical theories that in turn inform different teaching and learning activities which can be represented using a Learning Design notational system. At the level of individual educators, the explication of these connections can help to clarify decision-making about teaching and how these decisions connect pedagogical theory, research evidence, learner characteristics and context in order to promote effective student learning. At a macro level, the same Map can be used to help structure academic debate about types of research evidence (including whether particular evidence is conflicting or rather about different facets of education), and the links between research evidence and types of teaching and types of student learning, in order to facilitate judgements about effective learning.

For everyday practice, the question of teaching and learning effectiveness depends not simply on the chosen pedagogical theory or the research evidence in favour of this theory. It depends on the wider mix of issues identified in the LD-CM such as: the characteristics and

values of institutions, educators and learners; the nature of the teaching cycle (and the granularity of teaching design); the use of descriptive frameworks for teaching and learning activities, together with guidance and sharing; the use of tools and resources to support implementation of teaching and learning; and the various responses of learners (e.g., reactions, assessment, evaluation).

The "best" pedagogical theory may be highly ineffective for student learning in a particular context if other parts of the LD-CM are not considered or implemented appropriately. Equally, a set of very difficult educational circumstances (e.g., education in a poor country) may still lead to highly effective learning where certain elements (e.g., a gifted teacher) overcome difficulties. Any thorough investigation of the effectiveness of a teaching and learning approach needs to examine the full set of interactions within the Learning Design Conceptual Map, including the potential for positive aspects of one part of the Map to override negative aspects in another part.

Part 5.1: Is effective teaching and learning always "learner-centred"?

There is one final issue in pedagogical theory that is relevant to this discussion of Learning Design. Many educators, particularly in the past, have tended to teach using methods that focus heavily on content transmission, and less on active learning activities for learners (such as student-led analysis, research and discussion as used in Problem-Based Learning). A preference for content transmission approaches is rarely due to a sophisticated understanding of the evidence to support this approach, rather, it is often simply a replication of the experience of past teaching practices – that is, educators often teach the way they themselves were taught.

This issue takes several forms. One has been a desire to shift education from being "teacher centred" to "learner centred", or "teaching centred" to "learning centred", or from the "sage on the stage" to the "guide on the side". This general view seeks to focus attention primarily on how the learner learns (and hence how all other aspects of education should revolve around this) rather than simply how the teacher teaches. Another way to view this is a shift from an "input" model of education (what the educator imparts to learners) to an "output" model of education (what do learners know and can do following teaching and learning activities). A focus on what learners actually learn is essential to an understanding of effective teaching and learning, and so to the extent that "learner-centred" means "what works for student learning", then being "learner-centred" is the foundation of effective teaching and learning.

But learner-centred is sometimes taken to mean that all learning must be led by the learner, and that teaching, particularly any type of direct instruction or drill and practice-style teaching, should be avoided. Given the many examples of ineffective content transmission-style teaching, based on unreflective past experiences of teaching, it is understandable that in some contexts there is a reaction against "teacher-centric" methods. In some circles, "teaching" is almost a dirty word.

However, this reaction against teaching can go too far. Even in teaching contexts with a strong focus on the learner, there is usually an important role for the educator in structuring the opportunities for learning, and scaffolding the learning process to assist learners to learn. These structuring and facilitation decisions can still be described and shared using a Learning Design descriptive framework.

Going further, different teaching approaches may be used for different subjects, and at different stages in learning. Certain kinds of learning may benefit more from direct instruction approaches (e.g., language learning, basic mathematics), whereas other kinds of learning may benefit from collaborative or constructivism approaches (e.g., 21st century

skills). Hence, lecturing has a place among the suite of teaching methods that can assist a learner to learn. So, to the extent that "learner-centred" means little or no role for educators, we see many contexts in which this will not result in the most effective learning for students. Ill-informed and unguided discussion can be as ineffective for learning as poor content transmission.

This is not the place for a debate on the relative merits of different teaching and learning approaches for different subjects or stages of education, but we simply make the point that educators can use all the components of the Learning Design Conceptual Map to assist with designing and implementing effective teaching and learning activities, where the effectiveness is ultimately measured in terms of learning outcomes rather than teaching inputs. For most educators, this means using a wide range of teaching and learning approaches depending on what is most effective in their context. And to the extent that sharing learning designs helps educators to adopt new, effective teaching and learning methods, then ultimately student learning will improve.

Conclusion: Revisiting Learning Design Definitions

Many educators already use the phase "Learning Design" in a much more general sense than an abstract framework for describing teaching and learning activities or a Conceptual Map. Educators often use "Learning Design" to talk about their everyday decisions about how they teach, in the sense of "how do I design activities to help my learners to learn?" This is Learning Design as a practice – a verb – rather than as a static concept – a noun to describe a field of study. It is Learning Design as "designing for learning".

At this point we are conscious of Peter Goodyear's caution that learning takes place inside the learner, and so there is nothing an educator can do to ensure that learning takes place (Goodyear & Retalis, 2010). However, an educator can carefully design teaching and learning activities that encourage learning to take place – this is what we mean by "designing for learning".

Given the conceptual foundations we have laid in this paper and our discussion of effective teaching and learning approaches, we now offer a new synthesis for the field of Learning Design. The concept of a framework for describing teaching and learning activities (based on many different pedagogical approaches) that we have earlier defined as "Learning Design" can now be given a more precise phrasing as a "Learning Design Framework" (LD-F). The Learning Design Conceptual Map (LD-CM) provides the link between the core concept of the LD-F (together with guidance and sharing) and the wider educational landscape. The day-to-day practices of educators as they design for learning, and increasingly use the evolving Learning Design Frameworks and the Learning Design Conceptual Map to guide them, can be called Learning Design Practice (LD-P). Taken together, these three ideas provide a foundation for the future of the field of Learning Design – see Figure 11. A summary of the central ideas of the whole Larnaca Declaration on Learning Design is provided in the Appendix.

Given the breadth of this new definition of Learning Design, it is reasonable to ask whether the scope of Learning Design has become so broad as to be synonymous with "good pedagogy". While the rich pedagogical literature on effective teaching and learning is all relevant to Learning Design, a distinction can be drawn between the core Learning Design concepts of Representation, Guidance and Sharing – and how these are implemented primarily in the "design and plan" step in the Teaching Cycle – and the wider goal of good pedagogy. One example of where the line can be drawn is the skill of adapting in the moment while teaching – we believe this is an essential skill of educators, but it is not the same as Learning Design; and a training course for educators that taught both Learning Design and adaptation would be teaching quite different types of skills. Future research can

be expected to further delimit the core of Learning Design (LD-F and LD-P), the factors that affect it (LD-CM), and the wider context of all relevant skills and understanding for effective teaching.

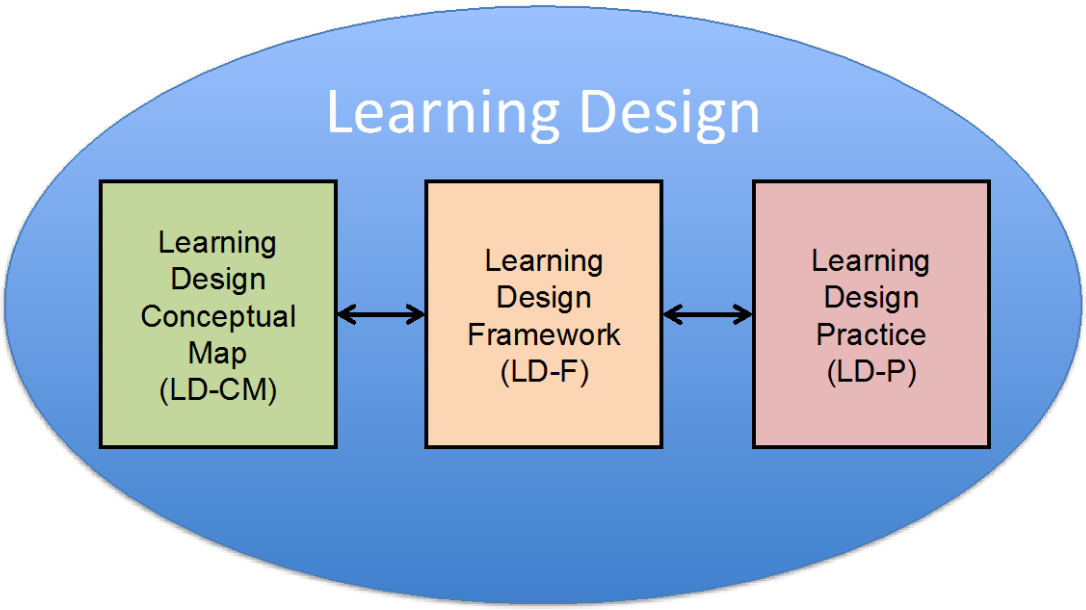


Figure 11: Components of the field of Learning Design

Epilogue

The development of music notation was crucial to the widespread propagation of beautiful music. While education is yet to develop a comparable system of notation, research on Learning Design Frameworks gives us hints of what this might look like in the future, informed by the wider Learning Design Conceptual Map. If a notation system (or systems) for describing teaching and learning activities is developed and widely adopted, its success will be due to a complex mixture of its accuracy, expressiveness and historical contingencies. Its ultimate goal, though, is not just representation for representation's sake, it is to help educators to describe, share and adapt effective teaching and learning activities – that is, designing for learning, or Learning Design Practice.

It may be that the analogy of music notation will take us a considerable distance, but later be found to be missing some elements of education. The need for educators to adapt or "improvise" in the act of teaching in response to their interactions with learners seems one significant issue for deeper consideration. Perhaps Jazz music will provides an enriched music analogy – it is an example of music that can be retrospectively notated like other music, and yet the act of performance is often based on a combination of professional skill together with just the essence of some musical idea (as opposed to performance of a complete, static musical score).

In this paper we have used the success of Western music notation to help us imagine a similar system of educational notation. In practice, we already have a range of proto-

notational examples, and it may be that several different education notation systems will arise in the future, each with different descriptive strengths and weaknesses. Within any given system, there may be multiple diagrams needed to convey the richness of teaching and learning activities (like the multiple diagrams of UML in software development). So while the analogy of music notation can take us far, we believe a unique solution for education will be needed that is unlike anything else. The challenge, now, is to create it.

If education fails to develop a general system of notation, it is hoped that even the attempt to do so will teach us deep truths about the fundamental nature of education, and that these truths themselves will contribute to more effective teaching and learning approaches in the future.

Appendix

Acknowledgements

This paper was based on ideas arising from a meeting of Learning Design experts in Larnaca, Cyprus on Tuesday 25th September 2012 and subsequent discussions (hence the name "Larnaca Declaration on Learning Design").

Before and after the Larnaca meeting, a number of other meetings have discussed similar issues, and these discussions have contributed to the current ideas. Participants in these other meetings have included: Diana Laurillard, Spyros Papadakis, Chris Alexander, Liz Masterman, Sheila MacNeill, Scott Wilson, Yannis Dimitriadis, Peter Goodyear, John Hedberg, Gregor Kennedy, Paul Gagnon, Debbie Evans, Kumiko Aoki, Carlos Alario, Chris Campbell, Matthew Kearney, Ron Oliver, Shirley Agostinho, Lori Lockyer and others. We are grateful to all our colleagues for their insights.

Summary of Larnaca Declaration on Learning Design

The central ideas about Learning Design in the Larnaca Declaration can be summarised as:

- Representing learning designs in formal ways (LD-F)
- Sharing and re-using learning designs
- Encouraging localisation of learning designs for the needs of learners, and adaptation to different disciplines
- Focusing on pedagogy in all its forms across all sectors and disciplines (LD-CM)
- Applying the teaching cycle to implementing and improving learning designs
- Emphasising how learners learn, and hence how educators can teach effectively (LD-P)
- Building software to implement and share learning designs

Glossary

Learning Design (capitalised): The field of Learning Design

a learning design (uncapitalised): An individual example of a sequence of teaching and learning activities, also called a "design" or "sequence". A learning design is a plan for potential activities with learners, which is to be distinguished from a particular implementation of this plan with a particular group of learners (see "a running learning design")

a running learning design: The implementation of a learning design with a particular group of learners, also called "a running sequence".

IMS Learning Design: An example of a technical language for implementing the concepts of Learning Design in software

Learning Design Conceptual Map (LD-CM): A map of the wider educational landscape as it relates to core Learning Design concepts – see Figure 4

Learning Design Framework (LD-F): A descriptive language/notational format/visualisation for describing teaching and learning activities based on many different pedagogical approaches

Learning Design Practice (LD-P): The action of applying Learning Design concepts to the creation and implementation of effective teaching and learning activities, also called "designing for learning"

teaching strategy: An approach to teaching that proposes a particular sequence of teaching and learning activities based on certain pedagogical assumptions. Examples of teaching strategies are capitalised in this paper, for example, Problem Based Learning, Predict – Observe – Explain, Role Plays and WebQuests. A teaching strategy can provide a pedagogical rationale as well as a suggested structure of activities for a learning design.

How To Cite The Larnaca Declaration

Please cite this version of the Larnaca Declaration as follows:

Dalziel, J., Conole, G., Wills, S., Walker, S., Bennett, S. Dobozy, E., Cameron, L., Badilescu-Buga, E. & Bower, M. (2013). The Larnaca Declaration on Learning Design – 2013. Available at www.larnacadeclaration.org

Chapter 4: Developing scenario learning

Background – PBL and role plays[6]

One of the important recent shifts in education has been a move away from content-transmission models of teaching and towards teaching strategies that foster active student engagement in solving authentic problems and the application of knowledge to real world problems (e.g., Ramsden, 1992). These teaching strategies often focus on the development of skills such as teamwork, communication, research and problem-solving in addition to understanding content knowledge. These skills can be described as "21st Century Skills" (Partnership for 21st Century Skills, 2011), general capabilities (ACARA, 2012) and the generic attributes of a graduate (Barrie, 2005).

Problem-based learning overview

Problem-Based Learning (PBL) is an example of a teaching strategy that focuses on the development of teamwork and problem-solving skills (Hmelo-Silver, 2004). PBL is based on a facilitator working with a small group of students in a structured process around a complex authentic problem (Cameron, 2010). It is a student-led process of discussion and research in which the facilitator plays a supporting and guiding role, rather than the traditional teaching role of "content expert" and "lecturer". While PBL can be used across many disciplines, it is widely known for its use in medical education (Savery & Duffy, 1996), where PBL typically applies to several face to face class sessions (often 2 hours each) spread over 1-2 weeks, with student research activities between classes.

To summarise the process in terms of typical learning activities: students start by analysing and discussing the problem, including sharing any relevant prior knowledge. Next, students work together to determine where they need to conduct research to gain new knowledge in order to understand (and try to solve) the problem. Students will often divide up research tasks between the members of the group (individually or in small groups). Students then spend time (usually away from class) conducting research in order to gain knowledge to share back with the group (typically after a number of days). The students then "pool" their understanding based on their research and use this to further analyse the problem. The facilitator may at this point provide advice or guidance on issues that need consideration, and may even take on the role of the patient from the problem (in medical cases) in order to simulate the experience of the students asking questions of the patient in order to test their hypotheses about the problem. Students may also select certain laboratory tests, with the facilitator providing test results. Students typically then conduct another period of research away from class in order to investigate new lines of inquiry, and to seek to confirm the group's preliminary solution to the problem. After reconvening, the students share their

[6] This chapter is based on Dalziel, J. (2012). Developing Scenario Learning and its implementation in LAMS. In L. Cameron & J. Dalziel (Eds), *Proceedings of the 7th International LAMS Conference: Surveying the Learning Design Landscape* (pp32-39). 6-7 December 2012, Sydney: LAMS Foundation.

additional research and use this to propose a solution to the problem and provide a rationale for this solution. The facilitator then provides feedback on the solution and rationale, including advice about key issues that may have been missed or misinterpreted.

While the above provides a summary of the typical PBL process as often used in medicine, there are many possible variations: for example, sometimes only one research stage is needed, rather than two. More broadly, the general investigative structure of PBL is used in many other disciplines where it may not follow the specific steps of a medical PBL. That is, the underlying style of teaching is similar – student-centric, group-based, problem-oriented, research-driven and an active rather than passive approach to the construction of knowledge by students. In some contexts this is known as "Inquiry Based Learning" (e.g., Levy, Aiyegbayo & Little, 2005) and in other contexts this style of teaching does not have a particular "name" but follows a similar approach.

Role play overview

Another teaching strategy with a focus on generic skills like teamwork and communication is a role play (McLaughlan et al, 2001; Wills et al, 2009). There are several types of role plays – such as language learning role plays (where students practice their speaking skills) or business role plays (where students practice certain types of business interactions, e.g., call centre conversations). In this paper, however, role play has a more particular meaning in terms of teaching scenarios where student take on a role and play out this role in a situation that often requires them to act in ways different to their own personal beliefs, and this potentially leads them to reflect more deeply on unfamiliar ideas and opinions (Vincent & Shepherd, 1998). This essence of this kind of role play is "walking in the shoes of others" and is based on the metacognitive skill of self-reflection and the ability to question one's own assumptions.

A typical structure for a role play in terms of learning activities is that students are introduced to a scenario that has a number of different actors/roles. Students are assigned to a role and then conduct research on their role. In many cases multiple students are assigned to each role, so students within a particular role group can work together on research and discussion of their ideas about their role. After a period of research and reflection on their role, students then enter into the role play "proper" and play our their role within the scenario, interacting with students in other roles. Most role plays involve some form of tension or conflict between roles, so students act out their role and try to understand the reasons for the conflict and different starting assumptions, and then try to negotiate a solution. After the role play proper, student step back from their roles and "debrief" by reflecting on their role and the differences between their role's ideas and their personal ideas (usually in discussion with other students and a facilitator).

As with PBL, there are many variations to the typical role play structure, such as more than one period for the role play "proper", including options for bilateral discussion between pairs of roles in order to work towards negotiation of a solution (e.g., Versailles role play in IMS Learning Design, 2003). Some role plays may include an "event" that occurs during the role play that changes the scenario or changes the relationships between roles, and hence requires participants to adapt to these changes.

Alternative requirements to PBL and role plays

While PBL and role plays are effective teaching strategies in many contexts, there may be other teaching contexts that have alternative requirements to the standard implementation of these approaches. For example, medical PBL is typically implemented with a single correct solution, whereas in other disciplines, there may no obvious correct solution to a problem, and an important focus of student learning is considering different possible interpretations and approaches to a problem. A different limitation can arise from the "static" nature of most PBL scenarios – that is, the scenario doesn't change after initial presentation. There are other teaching contexts where an evolving problem is important to student learning, both in terms of the ability to react to changing circumstances, but also for re-evaluation of initial assumptions/interpretations in the light of new information.

In the case of role plays, an alternative requirement for student learning might be that students imagine their attitudes and reactions in a given scenario *as themselves*, rather than as a different role. There are many cases where students can reflect on how they might handle future employment scenarios (e.g., psychology, business, government) given their own ideas, attitudes and values, rather than as an imagined role. Another benefit of focussing on a student's own approach is that it avoids any potential disjunction arising from lessons learned while playing a role that may not be integrated into the student's own beliefs (e.g., if debriefing and consolidation of learning is insufficient). Finally, as with PBL, many role plays are based on static scenarios, whereas there can be benefits from an evolving scenario (as role plays with mid activity "events" illustrate).

In summary, the general structure of PBL and role plays, together with the alternative requirements needed for other kinds of learning (as described above) provide a foundation for a new kind of teaching strategy.

Developing scenario learning

Developing Scenario Learning (DSL) is essentially a hybrid of PBL and role plays. It begins with an authentic problem/scenario – typically a situation that learners could encounter in their future working lives. Unlike role plays, learners respond to this scenario as themselves – that is, they imagine how they would react in the future given that they become professionals in the discipline area of the DSL. Unlike PBL, the scenario does not have an obvious correct answer, rather it is open to a range of interpretations and possible actions. Students should be able to discuss the evidence for various interpretations and the merits of different responses, with the focus of learning on discussing multiple perspectives and drawing out the implications of actions based on these perspectives.
In practical terms, the first phase of DSL is the introduction of the overall learning experience followed by presentation of the initial scenario. The second phase involves students considering the scenario individually and then as a group, and answering various questions to assist students to articulate their view and to see the views of others. Shared answers to these questions provide a foundation for general discussion, which can also include an opportunity for research or information gathering to inform discussion (in the style of PBL research). To push students towards making a personal judgment (rather than simply exploring a range of possibilities), the second phase ends with students documenting their plan of action to address the current scenario.

An example of a LAMS template illustrating DSL is provided in Figure 15, with the first and second lines of the scenario corresponding to the first and second phases described. In LAMS the Notebook and Q&A tools are used for reflection and sharing of answers to questions (and sharing the plan of action), while the "double tool" of Forum and Share Resources is used for general discussion and sharing of research. A stop point is used at the end of this phase to ensure sufficient time for student discussion prior to the next phase.

After the second phase, a development of the scenario is presented. While this development could take any form that is appropriate to the scenario topic, it is recommended that (in many cases) the evolution of the scenario be in a way that students might not have initially predicted, and that would lead students not only to reformulate their action plan, but also to reconsider their assumptions during interpretation of the initial scenario. From a metacognitive perspective, the development of the scenario could help student identify certain assumptions or biases in their initial reaction that led them to a plan of action that could be inappropriate given the development of the scenario. For example, consider the initial scenario and the development of the scenario described below (from an application of DSL to teacher training).

> Initial Scenario: You are a head teacher in a typical secondary school, trying to encourage staff to adopt a new teaching technique (role plays). An older male teacher, who is known to be quite conservative, is proving difficult to engage in the process – he seems to want to just continue as in the past. He seems not to be enjoying his teaching (he even complains he doesn't enjoy his newspapers anymore – which he was famous for always reading in the staff room), but does not seem willing to try new ideas. When you ask him directly about try this new approach, he is uncomfortable, distant and non-committal about what he will do.

After reflecting on and discussing this scenario in the second phase, students then proceed to the development of the scenario in the third phase.

> A week later you receive a letter from a psychologist who is treating the staff member for serious depression. The psychologist notes that his patient is a private person who would rather not raise his troubles at work, but recognises that he is not coping with the idea of changing his teaching approach, especially for a strategy that can be quite emotional for students. The idea of facilitating a role play is causing a lot of anxiety. At the same time, he finds little pleasure in his teaching as it is. The staff member wishes to continue teaching, but is finding change difficult.

In the fourth phase, students then follow a similar pattern of reflection, shared questions and discussion as the second phase, but with the focus now on how they would change their plan of action given the development of the scenario. In the fifth and final phase, students reflect on their interpretation of the initial scenario (in phase 1) and how the development of the scenario (in phase 3) may have led them to reconsider their assumptions about the initial scenario. These third, fourth and fifth phases are illustrated by the third, fourth and fifth "line" of activities in the LAMS template in Figure 15.

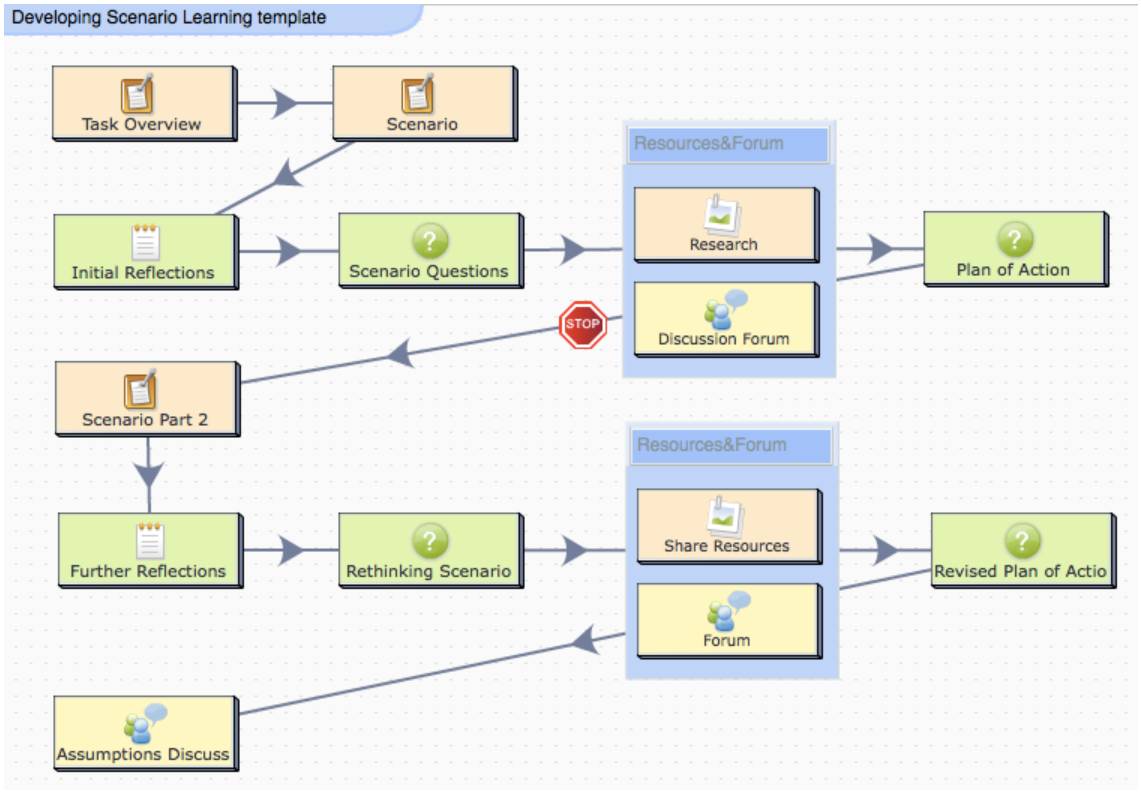


Figure 15: Template for Developing Scenario Learning (in five phases – one phase per line) in LAMS Author.

Sample questions for use in the second phase could be:

- What are your initial thoughts?
- What knowledge issues might be at play?
- What attitude issues might be at play?
- What emotional issues might be at play?
- What additional information/research might you need (either for yourself, or to address the situation)
- What do you see as the problem, and what is your plan of action to address this problem?

Sample questions that could be used in the fourth phase (that is, after the development of the scenario) could be:

- What are your new thoughts?
- How did your initial assessment of the situation fit with the psychologist's letter?
- How do you need to revise your strategies in the light of the psychologist's letter?
- What additional information/research do you need?
- What is your revised plan of action?
- What are your reflections on the whole scenario?

The sample template in LAMS illustrates a way of implementing DSL in a fully online context. However, the concept could equally be implemented entirely face to face, or as a blended learning approach. In terms of blended learning, if DSL was run over a fortnight using the LAMS template above, then a weekly face to face tutorial could be conducted in place of the discussion forums in the second and fourth/fifth phases.

There is an important role for the teacher as facilitator during DSL, particularly in guiding discussion. For example, the facilitator should watch out for students who struggle to adapt their plan of action following the development of the scenario – persistence with an inappropriate plan of action could indicate a type of "cognitive rigidity". As facilitator, it is important to watch out for this phenomenon among some students and to offer careful prompts to such students to help them see the need to reconsider their approach following changed circumstances. This may include gentle guidance to help students recognise that their initial interpretation was mistaken or insufficient.

Variations of development scenario learning

There are many small variations that could be made to the timing, choice of online tools and phrasing of questions in the DSL example above. Some more significant variations to DSL include:

- There could be two (or more) developments of the scenario (provided that this remains authentic to the discipline and scenario), allowing for multiple phases of reflection and reconsideration of action plans.

- If DSL is used multiple times within a course, then over time student might tend to leap to unlikely or surprising interpretations of the initial scenario (based on prior DSL examples). To overcome this, it would be useful to include some more "likely" scenario developments after some less expected outcomes so as to encourage students to consider both likely and less likely interpretations of initial scenarios.

- For a more complex implementation of DSL, students could be asked to make a decision on a plan of action at the end of the second phase – for example, whether to act on a certain dimension of the problem or not (e.g., in the teaching scenario above, the decision could be whether to raise performance concerns with the teacher, or to focus only on advice). Based on the group's decision, there could be two different developments of the scenario (arising from the nature of the decision). In terms of implementation in LAMS, this could be implemented using Branching based on Voting (NB: students would need to agree on their vote as a group, and then each student individually chooses the same vote in order for all students to be taken to the appropriate branch). Going further, there could be more than two voting options (and hence more than two branches), and it is possible to imagine a subsequent voting decision after the first vote and the subsequent development of the scenario, leading to a "branch within a branch" (an example of this in LAMS is given in Figure 16).

- A different style of DSL is a crisis situation, such as responding to an evolving bushfire or security threat. In this case, student may have different information presented regularly (e.g., daily) over a period of time (1 week), with students expected to discuss and make decisions throughout the developing scenario. An example of this structure using timed “Stop” points in LAMS is given in Figure 17.

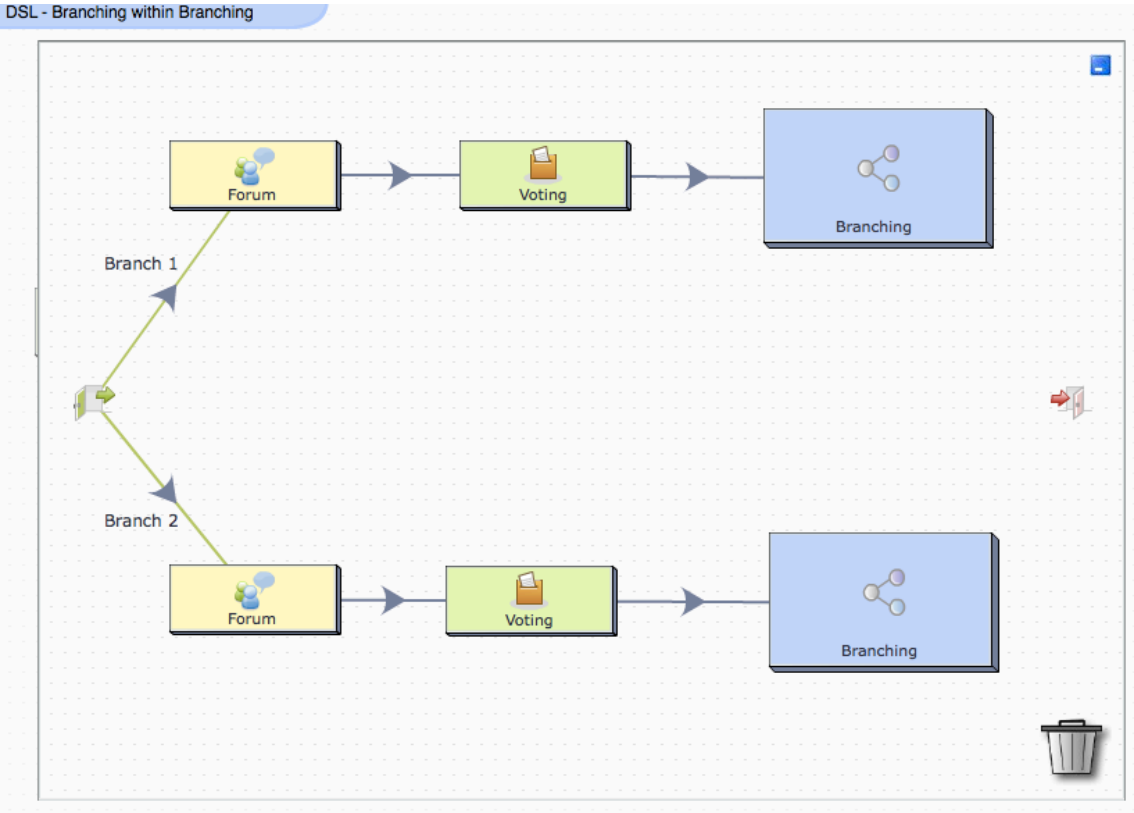


Figure 16: A view of a Branching activity within LAMS showing initial Branching according to a previous Vote (not shown), followed by discussion in a Forum, then a further Vote, leading to a second Branching activity (NB: the sequence ends at the end of each branch – the branches do not merge back together again at the end) - the outcome is four different final scenarios.

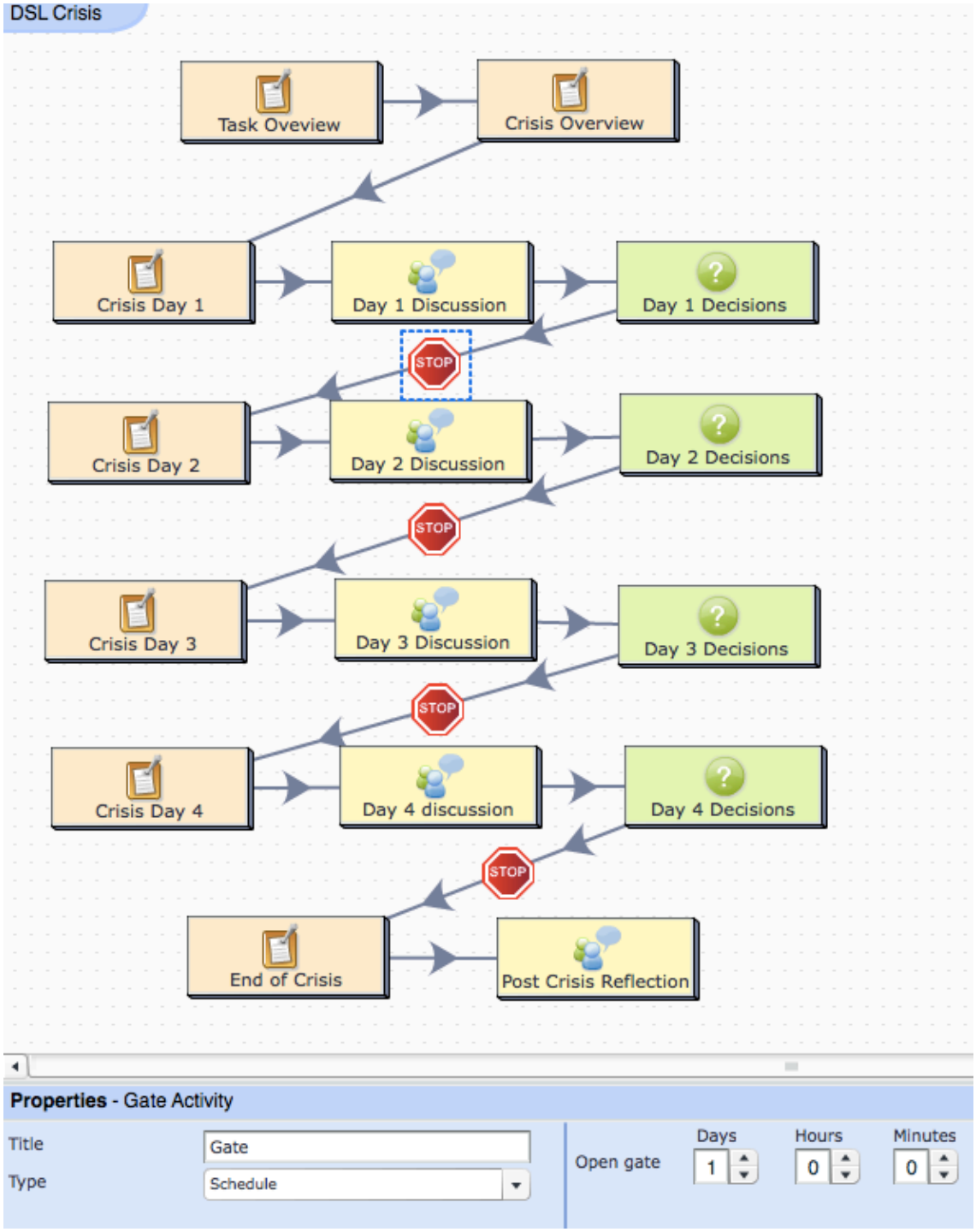


Figure 17: A crisis-style example of Development Scenario Learning in LAMS using timed Stop points (see Preference area at the bottom for end of Day 1 Stop point).

Conclusion

Developing Scenario Learning (DSL) is not a completely new teaching strategy – indeed, there may be examples similar to those described above already in use by teachers in various contexts. This paper has attempted to provide a conceptual background to this approach based on a hybrid of PBL and role play concepts, together with the development of a scenario (often in unexpected ways) and the implications of a developing scenario for metacognitive learning such as reflection on assumptions and biases. DSL is likely to be of use in the humanities, social sciences and professional education (such as law, business, teacher training, psychology, etc.) where there is value in having students consider scenarios from different perspectives, and reflecting on their assumptions when making decisions about actions, as well as the ability to change a plan of actions according to changing circumstances and revised assumptions.

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Appendix: Evaluator's report

James Dalziel – ALTC/OLT Fellowship Evaluation Report

Introduction

This report represents an evaluation of James Dalziel's ALTC/OLT fellowship on Learning Design. The report will describe the key milestones of the fellowship and significant outputs.

The role of the evaluation

The evaluation is a formative, critical reflection of the fellowship, the process involved and a comparison of the outcomes achieved against the aims of the original proposal. In a sense I acted as a critical friend. I participated in all four face-to-face meetings of the expert group that James established. In addition, I remained in regular contact with James over the past two years, via email and Skype.

Background

The fellowship focused on a new research field, which has emerged in the last ten years – namely Learning Design. It enabled researchers in the area to come together over the past two years to discuss the field, to articulate what it is about and to clarify how it is distinct from related fields such as Instructional Design.

James is the founder of the LAMS (Learning Activity Management System),[7] which was one of the first Learning Design tools to be developed. The LAMS tool provides a visual interface for teachers to create a Learning Design, which can then be run with students online. A key feature of LAMS is that it focuses on learner activities rather than content and produces a sequential visual representation of the design. James is one of the leading experts in Learning Design and has developed good connections and collaborations with others in the field.

The need for Learning Design

Designing for learning is arguably the key challenge facing education (Conole 2013) as it provides a mechanism for teachers to create pedagogically effective learning interventions that make innovative use of technologies. It can enable teachers to think of creative ways to present information and foster communication and collaboration between students. Clearly technologies offer a multitude of ways to foster different pedagogical approaches (Conole 2010; Conole and Alevizou 2010), however the reality is that e-learning has not had a significant impact in practice (Molenda 2008; Ehlers 2011). Learning Management Systems are primarily used as content repositories (Conole 2012), Open Educational Resource repositories are not being used significantly by learners and teachers (McAndrew, Santos et al. 2009). There are a number of reasons for this, but the main one is that learners and teachers lack the necessary digital literacy

[7] http://www.lamsinternational.com/

skills (Jenkins 2006) to harness the potential of technologies. Learning Design provides the guidance and support teachers need to incorporate technologies into the learning activities they create. The 'Larnaca Declaration', one of the key outputs of the fellowship, (2012) argues that the 'field of Learning Design contributes to the central challenge of effective teaching and learning. Learning Design can assist educators to describe good teaching ideas so that they can be shared with and adapted by other educators'.

Meetings

Over the past two years a group of Learning Design researchers have met as part of the fellowship. The meetings included:

- A pedagogical planner meeting in Oxford (29/9/11)
- A JISC CETIS design bash in Oxford (30/9/11)
- A LDSE meeting in London (3/10/11)
- A WISE meeting in Berkley (7/10/11)
- A fellowship experts meeting in Sydney (12-13/12/11)
- A fellowship experts meeting in Larnaca (24-25/12/12)
- A fellowship experts meeting in Sydney (20/11/12)

Towards a shared understanding of the field

The meetings enabled the researchers to share their Learning Design work and provided an opportunity to develop a shared understanding of the field. Interestingly, Learning Design has emerged primarily from researchers in Europe and Australia, whereas Instructional Design is more prevalent in America. The expert group incorporated the key researchers in the field. The 'Larnaca Declaration' section of the final report (Dalziel 2012a) lists the researchers who have been involved in the fellowship, and the report also lists the meetings held and the presentations given. This represents a significant set of outputs and dissemination activities internationally, both at institutions and conferences. James is also the chair for the LAMS and Learning Design conference, which is now in its 7th year. A Learning Design stream has now been agreed for the ICEM conference, which will be held at Nanyang Technological University in Singapore in September 2013. The fellowship has also enabled James to give numerous presentations on his work at various events and conferences in Australia and worldwide. The outputs of the group include presentations, web resources and publications and have resulted in Learning Design getting greater recognition across the research community.

In addition to the face-to-face meetings, James met with the experts on an individual basis over the past two years. The group also communicated virtually, primarily through email, to discuss and work up ideas for workshops and conference presentations and to discuss project outputs.

Outputs

As listed in the final report, the fellowship has enabled James to produce a number of publications, these include: 2 journal articles, 1 book chapter, 3 conference presentations, 2 edited conference proceedings, 9 unpublished conference

presentations and 2 Learning Design blog websites. In addition, he produces a monthly LAMS newsletter.

Key moments

The fellowship provided a valuable mechanism for us to develop our collective understanding of our research. Meeting face-to-face proved invaluable, as it provided us with an opportunity to share and discuss ideas. Interestingly, the originally intended two meetings were insufficient. A third opportunistic two-day meeting in Larnaca (just before the ICEM 2012 conference) represented a turning point for the group. Outputs from this meeting included a details timeline of key milestones in Learning Design research and a conceptual framework, named the 'Larnaca Declaration. The experts involved valued the meetings and were committed to developing a shared understanding and to work together towards the development of a collective Learning Design conceptual framework. Research areas emerge to address particular problems. In the case of Learning Design the central issue is that teachers need support and guidance for design. As a result over the last ten years a range of tools and resource have been produced to this effect. With any new research area it is important to have time to reflect and develop a shared understanding. The fellowship has provided a valuable means of achieving this. As James has noted in the report, he has valued this time for reflection after a busy period of development, but I would suggest that the field as a whole has benefitted as others have joined with James in this period of reflection fostered by this fellowship. As a result we now have a good definition of what Learning Design is and an associated framework. In addition, we have developed a timeline, which shows the major developments in the field, including: tools, publications and events, and communities.

Related work

The fellowship was timely given the status of the field. Two key texts on Learning Design were produced before the fellowship (Beetham and Sharpe 2007; Lockyer, Bennett et al. 2008) and more recently two members of the expert group have published Learning Design books (Laurillard 2012; Conole 2013). The discussions in the expert group have clearly being important in the writing of these books. In particular, Conole (2013) aims to articulate Learning Design and describe how it is distinct to the more established field of Instructional Design.

In addition, it ran alongside a related initiative in Europe, the EU-STELLAR funded Learning Design Grid, which brought together experts in the field. LDGrid has produced a comprehensive website[8] listing key Learning Design tools, resources and initiatives. Members of LDGrid are also part of a follow on initiative, a MOOC on Learning Design,[9] which will be launched in January 2013. Over 1, 000 participants have signed up for the course and the associated Cloudworks site has had over 3, 000 views to date.

[8] http://www.ld-grid.org/
[9] http://cloudworks.ac.uk/cloud/view/6336

Challenges for the field

In a recent presentation Dalziel (2012b) lists the following challenges for the field:

- A lack of awareness of Learning Design as a field (particularly in the USA)
- Confusion over the differences between Instructional Design and Learning Design
- Time demands for implementation
- Unrecognised amongst the noise of educational technology

The fellowship enabled us to come together to discuss these challenges and to articulate how they can be addressed.

Experts' views

The experts involved in the fellowship were asked to reflect on their experiences of being involved with the project. They were asked the following questions:

1. Reflections on being involved?
2. What was beneficial?
3. Any challenges?
4. What are the key achievements and outcomes?

1. I found the involvement in James' fellowship intellectually stimulating because he was able to bring together people with a range of perspectives on learning design and this provided stimulus for both looking back and looking forward.
2. The face-to-face meetings were the most valuable.
3. One potential challenge might be the differential levels at which people got involved. I don't really think this is a challenge as such because that's just the way it is working with a group, particularly a group of academics with diverse roles and interests.
4. I think James' report as an extended piece of writing that captures and acknowledges range of perspectives is an important outcome, as is the strengthening of the network of researchers and practitioners in LD.

Sue Bennett, University of Wollongong

1. The experience was professionally beneficial to me from research and teaching perspectives. The meetings provided a quick, easy way of becoming abreast of what was happening throughout the world in the area of Learning Design and gave us access to question and bounce ideas off those who "understood".
2. Being able to bring together the world's Learning Design experts to discuss the field and have some extended time to develop relationships so we felt comfortable to discuss what we really thought with each other. Getting international perspectives first-hand was of significant benefit. This was then further disseminated by having most of the visitors to Australia in 2011 able to contribute to the LAMS Conference. James was also able to bring back further thoughts from his various trips to share with us. This will have a long-standing benefit to the field and future benefits in publications.

3. If only everyone's time together could have been longer. Without continued funding I know a number of us will not be able to be brought together again to further develop ideas, write chapters, etc. Imagine what could have been achieved if the Fellowship could have continued over 2 years!
4. The progress we made in Larnaca was a highlight for me. Defining the field, the concepts and the terms we use will be most helpful not only to us, but to the study of the field in the future. The value of this in an emerging field cannot be under-estimated. I don't think this could have been possible without what went before. I was so pleased we now have something documented after many years of meetings.

Leanne Cameron, Australian Catholic University

1. It was useful and empowering for me to be a part of this initiative. It helped me to connect with the field of Learning Design and understand its roots.
2. Being able to exchange ideas with eminent experts in the field and learn from them was invaluable.
3. Limited time, and it would be good to work towards the aim of uniting the entire Learning Design community.
4. The final report helps to draw together the key themes in Learning Design and introduce newcomers to the history and purpose of the field. The connections made were also extremely useful.

Matt Bower, University of Macquarie

1. An Australian Fellowship on Learning Design has been a very effective way of bringing researchers who are distributed world-wide together into a more recognisable community. Previously only one or two people could connect at events, usually in the Northern Hemisphere, which the Southern Hemisphere researcher/practitioners cannot afford to do with any regularity. Previously this fledgling field of educational research could be characterised as ad hoc and sporadic. Now, the Fellowship's international and inclusive approach has given the community an identity and provided directions for moving forward as a community.

Sandra Wills, University of Wollongong

Outcomes against the aims of the proposal

In the original proposal (Dalziel 2011), the following were listed as the main aims of the fellowship:

- *The fellowship will promote the adoption of Learning Design across a wide range of higher education discipline areas.* This has been achieved as is evident in the number of presentations and workshops delivered at different institutions and international conferences. In particular the LAMS and Learning Design conference is now well established and has good attendance. In addition, there is a vibrant worldwide community associated with LAMS,[10] which provides a space for teachers to share and discuss learning and teaching ideas and designs. James has also been engaged with the related Cloudworks[11] community, which provides a social networking space for teachers.
- *The fellowship will provide an opportunity for experts in the field to come together and consolidate the work to date on different visual representations.* This has been achieved, as a group we now have a collective view on the central focus of our research through the Learning Design framework we have developed. In essence at the heart of our work are tools and resources to provide guidance (such as the Learning Designer tool developed by Laurillard and others), visualisation (such as the LAMS tool and the conceptual design views developed by Conole and others) and mechanisms for sharing and discussing learning and teaching ideas and designs (such as the LAMS community and the Cloudworks site).
- *The proposal includes the running of 8 national workshops and 4 discipline workshops.* Successful national workshops were conducted in Sydney, Melbourne, Brisbane, Adelaide, Canberra, Darwin and Perth. The challenge of facilitating workshops for disparate discipline groups has been addressed via discussions with key discipline representatives, and the creation of online presentations to be disseminated within these discipline groups. In addition to these workshops, James has been opportunistic in taking every opportunity to present on his Learning Design work, along with the work more generally of experts in the field, for example, James has given a number of presentations for theological colleges on Learning Design as opportunities arose over the life of the fellowship.
- *The fellowship will produce a new integrated model for describing and sharing Learning Designs.* A significant output from the expert meetings was the developed of a conceptual Learning Design framework at the Larnaca meeting in September 2012 called the 'Larnaca Declaration' (2012). This was further refined in the final meeting in November 2012 at Macquarie University. The framework provides a clear articulation of our collective understanding of the field. Focusing on the central research question we are addressing, the theoretical and methodological underpinnings, the learning context and the tools and resources that have been developed. Arguably it represents an overarching framework, which can be adapted to take account of different approaches to design; from socio-cultural perspectives based on mediating artefacts (Conole

[10] http://lamscommunity.org/
[11] http://cloudworks.ac.uk

2008) for design through to Instructional Design approaches (Reigeluth and Carr-chellman 2009).

Conclusion

To conclude, the fellowship has more than exceeded the original aims laid out in the proposal. It has contributed to raising awareness of Learning Design across the broader research community and has enabled researchers in the field to develop a collective understanding of the state of the art in Learning Design, along with a conceptual Learning Design framework. It has occurred alongside a number of significant Learning Design programmes, in particular the JISC-funded Pedagogical Planner programme and the Curriculum Design programme, which fellowship experts were involved with. The outputs of the fellowship will feed into on-going research activities, including the EU-funded METIS project (James is on the Advisory Board for this project). The group intends to continue collaborating, through opportunistic meetings, joint publications and presentations at workshops (for example the group aims to put in a proposal for the ICEM 2013 conference in Singapore). A significant aim is to write a co-edited book. This will include a detailed description of the Learning Design framework we have developed, along with chapters on the state of the art of the field.

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