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An examination of learning design descriptions in an existing learning design repository

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The past decade has seen a significant expansion of flexible learning in higher education as new communication technologies have broadened the scope and potential for online learning. With this expansion has come the need for pedagogically sound learning experiences and an interest in reusing effective pedagogical designs. The concept of a 'learning design' - a formalism for documenting educational practice to facilitate sharing and reuse by teachers, is being researched as one way of supporting dissemination of 'best practice'. This paper reports an analytical study that sought to advance understanding of what constitutes an effective learning design description based on an analysis of learning designs in an existing repository. The study contended that an effective learning design description comprises a clear description of the pedagogy, a quality rating and advice on potential reuse. Six, from a repository of 32, were identified as effective learning design descriptions.

Keywords: learning design, educational design, reusability

Introduction

As educational design practice in the higher education sector attempts to move from traditional structures of lectures and seminars to more flexibly delivered approaches, educators find themselves challenged to plan engaging and effective learning experiences for students. Additionally, the broadly accepted move toward the integration of technology into teaching practice is also challenging educators to maintain their current knowledge of the affordances of ICT (that is, the opportunities created by the technology) as a tool to enhance teaching and learning. With numerous commitments of research and professional engagement as well as teaching, university teachers often find themselves lacking the opportunity to pursue time intensive literature searches or generalised workshops relating to the implementation of more modern pedagogies in their educational settings. The need for relatively 'easy-to-access' support for teachers has led to a body of research that is examining ways of documenting and representing educational practice to facilitate understanding and sharing with the ultimate aim to encourage reuse in multiple and different teaching contexts.

One concept being explored is that of a 'learning design' - a formalism for documenting teaching and learning practice to facilitate sharing and reuse by teachers. This paper reports a study that examined learning design descriptions in an existing learning design repository to identify the strengths and shortcomings in the descriptions that could influence their ability to be effectively shared and reused.

Background

The premise of learning designs is that if evidence-based effective educational designs can be documented in a systematic way, then teachers would be able to easily understand them, and thus able to select and adapt a learning design for implementation in their own teaching context. (An emphasis on adaptation of learning designs to new teaching contexts could also have the potential to enhance the practice of design itself.) However, how learning designs can be represented effectively so that teachers can both understand and reuse them in their own teaching context is a question that remains relatively unanswered. There is currently no consistent notation system for learning designs. Instead several learning design representations have emerged that define and document a learning design in different ways (Agostinho, 2009):

- *Educational Environment Modeling Language (E²ML)*: represents a learning design as a structured set of activities aligned to specific learning outcomes;
- *IMS Learning Design*: represents a learning design as a sequence of activities in the form of acts in a play;
- *Learning Activity Management System (LAMS)*: represents a learning design as a sequence of activity in the form of online tools used to run each activity;
- *Learning Design Visual Sequence (LDVS)*: represents a learning design as an illustration of tasks, resources and supports with accompanying textual documentation;
- *LDLite*: aims to help teachers integrate both face-to-face and online activities by documenting a learning design in a tabular form based on five key elements of IMS LD: tutor roles, student roles, content resources, service resources and assessment/feedback; and
- *Patterns*: represents a learning design as a solution to a design problem in the form of a textual description.

Whilst these learning design representations exist, there has been little empirical work conducted that examines: i. how they are being used, ii., their perceived usefulness to teachers, and iii. the essential characteristics that constitute an ‘effective’ learning design description. The research study reported here attempts to extend understanding of the latter issue by focusing on one learning design representation and examining the quality of learning design descriptions in a published learning design repository. The study aimed to determine if appropriate information had been provided so that a learning design could be easily, yet comprehensively, understood in order to facilitate its reuse.

One of the first projects to focus on the collection, evaluation and sharing of high quality learning designs was an Australian project titled, *ICTs and Their Role in Flexible Learning*. Funded by the Australian Universities Teaching Committee (AUTC) from 2000–2002, this project produced a repository of 32 learning design descriptions with the aim of illustrating innovative uses of ICT in higher education settings (Agostinho, Harper, Oliver, Hedberg, & Wills, 2008) in a format aimed at supporting reuse and adaptation to new contexts. These descriptions reside on the *Learning Designs Web site* (<http://www.learningdesigns.uow.edu.au>). A standardised learning design representation (LDVS) was developed specifically for the project and it was contended that this type of learning design representation could enable teachers to easily understand the ‘essence’ of the pedagogy in a learning design and thus could support the dissemination of ‘best practice’. The LDVS illustrates graphically (via the use of symbols) the sequence of the learning activities undertaken by students, together with the content resources and supports needed to aid in the achievement of intended learning outcomes. Accompanying textual documentation provides detailed information of the learning design. An example of a LDVS is provided in Figure 1. Table 1 outlines the structure of the learning design description presented on the *Learning Designs Web site*.

Since the completion of the *ICTs and Their Role in Flexible Learning* project, an international research agenda has advanced knowledge regarding the sharing, reuse, and representation of learning designs, particularly in higher education. The definition and constitution of a ‘learning design’ has evolved, and, as previously discussed, several learning design representations have emerged. Additionally, in terms of the reuse debate, there have been significant technical developments, namely with the technical standard IMS LD and its associated software players (eg., Paquette, Lundgren-Cayrol & Léonard, 2008). The *Handbook of Learning Design and Learning Objects* (Lockyer, Bennett, Agostinho, & Harper, 2009) offers a comprehensive review of the current research and covers the latest thinking about learning design, learning objects and their integration. The Handbook has also raised many issues about the limitations of current work including the lack of research about the format of effective learning design descriptions - thus the rationale for this study.

Research study purpose

The aim of this study was to examine the learning design descriptions from an existing learning design repository (the *Learning Designs Web site*) to determine whether they can be considered as ‘effective’ learning design descriptions. An ‘effective’ learning design description was defined as one that provides appropriate and adequate information so that it can be easily, yet comprehensively understood in terms of its original context and thus potentially reused by a teacher in their particular educational context.

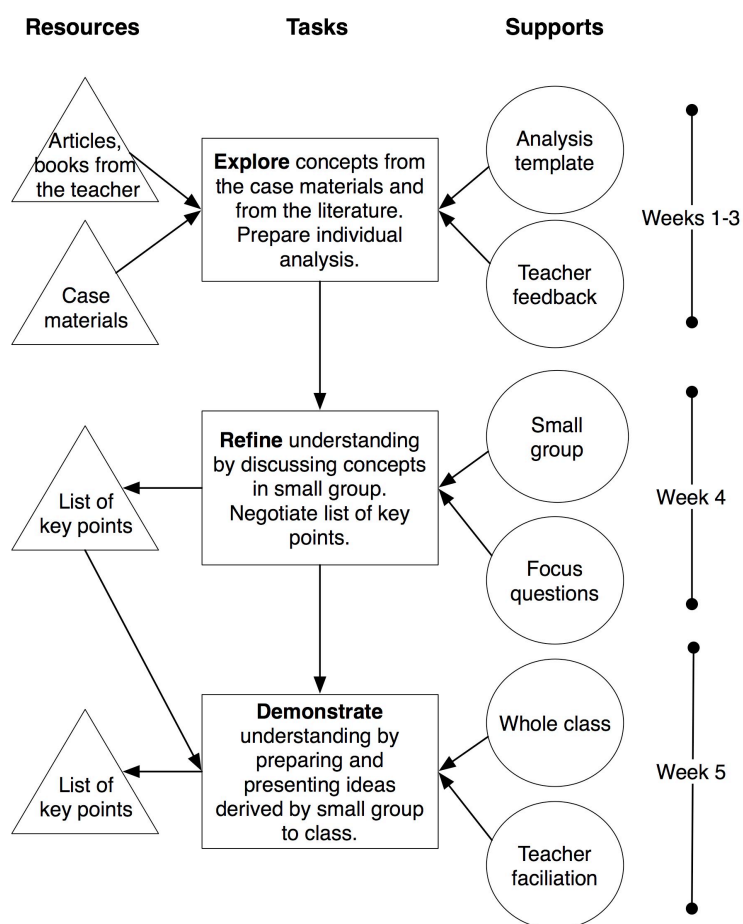


Figure 1: Example of a LDVS (Bennett, 2002)

Table 1: Structure of the learning design description presented on the *Learning Designs* Web site

<p>1. Summary</p> <p>1.1 Learning design title</p> <p>1.2 Focus, discipline, target audience, ICT used, and scope (ie., level of granularity)</p> <p>1.3 Summary statement of learning design</p> <p>1.4 Design team contact details</p> <p>1.5 Link/access to the actual learning environment</p> <p>1.6 Intellectual property and dissemination issues</p> <p>1.7 Relevant publications of the learning design implementation and evaluation</p>
<p>2. Detailed description</p> <p>2.1 LDVS</p> <p>2.2 Tasks</p> <p>2.3 Resources</p> <p>2.4 Supports</p>
<p>3. Implementation context</p> <p>3.1 Description of setting (eg., discipline, duration, ICT used, delivery method, target audience, number of cohort, how learning design fits within broader curriculum context)</p> <p>3.2 Intended student learning outcomes</p> <p>3.3 Assessment strategies</p> <p>3.4 Rationale for ICT use</p>
<p>4. Designer reflections</p> <p>4.1 Rationale for pedagogy used</p> <p>4.2 History of learning design (eg. origin, how many times implemented, modifications since its first use, dissemination issues)</p> <p>4.3 Details of evaluation research conducted</p> <p>4.4 Designer de-brief (eg. Did implementation of learning design achieve intended learning outcomes? Did any unintended learning outcomes surface? How are 'quality' dimensions (ie., engagement, context, challenge and practice) demonstrated?)</p>

The research was guided by two questions:

1. What are the characteristics of an effective learning design description?
2. In the existing learning design repository, which learning design descriptions are considered effective?

This analysis activity forms one component of a broader research study (Australian Research Council funded grant: *Improving University Teaching: Creating strategies and tools to support the design process*) that is examining how learning designs can be used to support teachers' design processes. See Bennett et al. (2008) for preliminary findings from another component of the broader study.

Methodology

The methodology for this study comprised two phases: (1) review of the learning design literature and development of an instrument to analyse learning design descriptions (to address research question one); and, (2) application of this instrument to the learning design descriptions in the learning design repository (to address research question two). The research team comprised six members (authors) all with extensive research and practical experience in the area of learning design research and design and implementation of online teaching in higher education.

Phase 1

The purpose of Phase 1 was to address the question: What are the characteristics of an effective learning design description?

Review of the learning design literature

A review of current learning design literature and research was conducted to identify the features and characteristics of an 'effective' learning design description regardless of what representation formalism is used.

Empirical studies such as the work of Falconer and Littlejohn (2006); Falconer, Beetham, Oliver, Lockyer, and Littlejohn (2007); as well as Agostinho (2006) and Bennett, Agostinho, and Lockyer (2005) reported findings from small-scaled focus group or interview research about practitioners' perceptions of the use and usefulness of various learning design representations. Other work such as Conole, Littlejohn, Falconer and Jeffery (2005); Falconer and Littlejohn (2009); Britian (2004); and Littlejohn, Falconer and McGill (2008) presented more analytical discussion about learning design representations and alluded to desirable features of learning design descriptions.

From this literature review, it is contended that an effective learning design description should include not only a clear description of the pedagogical design, but also should include some form of 'quality' rating and guidance/ advice about how the learning design could be reused. Specific implications that emerged from the literature review about desirable features of 'effective' learning design descriptions are summarised below:

- Explicitly describing the pedagogy of a learning design and providing a rationale for the pedagogy is deemed important (Falconer et al., 2007; and Falconer & Littlejohn, 2009);
- A rationale for the pedagogy, assessment policies, reflection and evaluation, student outputs and feedback, timings, audience, environment, variations, quality, adaptability, operational factors, & contingency plans are elements suggested to be important in a learning design description (Falconer et al., 2007);
- A graphical representation can aid understanding of a learning design (Agostinho, 2006, Falconer et al., 2007);
- The internal structure of a learning design according to IMS LD (that is, the elements described in a unit of learning – learning objectives, roles, activities, activity structures, environment, resources, and method) can aid the explicitness of a learning design description (Britian, 2004).
- Resources can be described more explicitly in terms of type (eg. case study), format (eg. book) and medium (eg. text) (Littlejohn et al., 2008); and
- An unambiguous definition of resources and supports within the LDVS formalism is required (Agostinho, 2006; Falconer et al., 2007).

Development of an instrument to analyse learning design descriptions

Findings from the literature review and the learning design descriptors presented in Table 1 formed the basis of criteria for the instrument, referred to as the *Learning Design Description Evaluator (LDDE)*, to analyse the learning design descriptions in the repository.

The LDDE instrument was tested for validity in two ways. Firstly, each research team member reviewed the draft instrument to ensure the instructions and guidance were clear and accurately reflected the criteria. Feedback was obtained through a team discussion and the LDDE instrument was refined. The revised instrument was then piloted with one learning design description in the repository (Mekong e-sim learning design (McLaughlan, Kirkpatrick, Maier, & Hirsch, 2002)). This learning design description was selected as it was perceived by the team as a well-described learning design. Each team member applied the LDDE instrument to this learning design description and feedback how to further refine the instrument was obtained via a team meeting.

The final LDDE instrument comprised ten description elements:

1. Summary of Learning Design
2. Explicitness of Pedagogy
3. Description of Tasks
4. Description of Resources
5. Description of Supports
6. Description of Implementation Context
7. Rationale for use of Technology
8. Evaluation of Implementation
9. Designer(s) Reflections, and
10. Advice/Guidance about Reuse.

The instrument provided instructions and guidance on how to rate each description element using a 5 point scale of 1: *Very Poor*, 2: *Poor*, 3: *Neutral*, 4: *Good*, 5: *Very Good*. For example, instructions for element 2. *Explicitness of Pedagogy* included: How explicit is the pedagogy of the learning design? Consider these factors when giving your rating:

- A rationale for the pedagogy used is provided and explained clearly
- Intended learning outcomes are clearly described
- Pedagogy is evident in the *Learning Design Sequence* and/or in *Tasks, Resources, Supports* description

Each learning design description was examined according to the ten description elements and thus could score a maximum total of 50 points. A qualitative comment to explain the rating given for each description element could also be provided.

Phase 2

The purpose of Phase 2 was to address the question: In the existing learning design repository, which learning design descriptions are considered effective?

Application of the LDDE instrument

The learning design exemplars within the *Learning Designs* repository was the source data for this phase. For each exemplar two reviewers independently applied LDDE instrument to all 32 learning designs. Subsequently a review meeting was held to resolve any differences in the reviews (i.e., cross-coder reliability). Exemplars were then ranked based on the combined scores.

Findings

The quantitative data was analysed by determining an average total rating for each learning design description and an average rating for each of the ten description elements. The qualitative comments were analysed to identify themes across each of the description elements. Of the 32 learning design descriptions in the learning design repository, three scored 40 points and higher; seven scored between 36 and 39 points; thirteen scored between 30 and 35; and nine scored less than 30 points. Learning design descriptions scoring 35 or less (22) were considered overall poor descriptions whilst learning design descriptions scoring above 35 (10) were considered relatively well-described. The learning design descriptions that scored highly were characterised by detailed and complete descriptions of the summary

of the learning design, tasks, resources, supports and the implementation context. Low scoring learning designs were characterised by lack of detail about the tasks, limited information about the linkages between supports, resources and tasks, lack of information about access to supports and tasks and a superficial description of pedagogy used. Many designers described supports and resources in very general terms without linking these components of a learning design to the actual activities the learner was being asked to engage in.

The data was discussed in a research team meeting and of the ten learning design descriptions considered well-described, four learning designs were deemed limited in their potential to be reused due to the context specific nature of the learning design and resources. Thus, six learning design descriptions were considered by the research team as overall effective learning design descriptions. The descriptions of these six learning designs were characterised by the following qualities:

- a clear summary and description of the pedagogy embedded in the learning design;
- detailed and complete descriptions of tasks, resources, supports and implementation context;
- informative designer reflections of the design and implementation process;
- clear and well argued rationale for the use of technology within the learning design;
- well supported with evaluation data; and
- offered some advice on reuse (something lacking in most of the others).

These learning designs coincidentally represent a range of disciplines and represent each of the five focus *Learning Design* Web site categorisations: two from 'role play' focus in the discipline areas of social science and environmental science (Brierley, Hillman, Devonshire, & Funnell, 2002; McLaughlan et al., 2002), one from 'procedure development' focus in the discipline of science (Kearney, 2002), one from 'problem based learning' focus in the discipline area of education (Angus & Gray, 2002), one from 'project/case based' focus in the discipline of education (Bennett, 2002), and one from 'collaborative' focus in the discipline area of information technology (Luca, 2002).

To examine how the LDDE performed as an analysis tool, the 64 reviews were analysed by calculating an average rating for each of the description elements. The results are shown in Table 2.

Discussion

The findings suggest that there are three important features of an effective learning design description: 1) a clear description of the pedagogical design; 2) some form of 'quality' rating; and 3) guidance/advice about how the learning design could be reused. In terms of learning design descriptions deemed effective in the existing learning design repository (the *Learning Designs* Web site), six were identified as effective learning design descriptions.

Table 2 shows that the elements that were most well-described were the summary of the learning design and the implementation context, while the most poorly described element was the advice/guidance about reuse of the learning design. This observation can be explained by the context in which the original project was implemented. Some of the participating designers worked in a single discipline area and may not have felt able to offer insights into the potential reuse of their designs in other disciplines. Conversely, there were several good descriptions of proposed reuse where designers had thought very deeply about the implications and requirements for reuse. These descriptions, however, were the exception rather than the norm. Given this, the lack of advice and guidance about reuse might be expected. The ambiguity over *resources* and *supports* is also understandable. The LDVS developed by the project was based on the work of Oliver and Herrington (2001) that allowed an overlap in the definition of these elements, making it difficult for learning design authors to understand the difference between a resource and a support. This ambiguity was not addressed by the original project and the confusion this led to accounts for the somewhat poorer ratings for the description elements relating to resources and supports. The poorly described evaluation research was also explainable, as many of the learning designs included in the project were relatively new, meaning that the designers had little prior opportunity to conduct evaluations.

There are several limitations of this study that must be acknowledged. Firstly, the findings are based on a review performed by the six-member research team. Whilst the findings inform the next stage of the broader research project, the validity of the LDDE instrument requires testing with teachers in the form of empirical fieldwork. Secondly, whilst clarity of communication/documentation of a learning design is considered important, little is known about the extent to which clear communication of a learning design

Table 2: Average description element ratings

Description elements	Average rating	Themes from reviewer comments
1. Summary of learning design	3.7	<ul style="list-style-type: none"> • Apparent mismatches between the LDVS and accompanying textual description. Often additional tasks were described in the textual description but not included in the summary or the LDVS
2. Explicitness of pedagogy	3.3	<ul style="list-style-type: none"> • Most descriptions explained the pedagogy that underpinned the learning design • For some descriptions it was not clear how the learning design was aligned with the educational theory espoused, for example how tasks related to the underlying pedagogy
3. Description of Tasks	3.4	<ul style="list-style-type: none"> • Task descriptions often lacked detail about how the tasks were implemented and the linkages between tasks, resources and supports
4. Description of resources	3.2	<ul style="list-style-type: none"> • Descriptions about resources and supports were often mixed together • Resources were sometimes described in the accompanying text but not included in the LDVS • There was a general lack of detail about how resources could be specifically used to help learners complete the tasks
5. Description of supports	3.3	<ul style="list-style-type: none"> • Descriptions supports were often mixed together with resources • Overall, supports were not described well. There was a need for more detail about how the teacher supports learners
6. Description of implementation context	3.9	<ul style="list-style-type: none"> • Implementation contexts were generally well described with most criticism focused on the lack of detail.
7. Rationale for use of technology	3.5	<ul style="list-style-type: none"> • The rationale for the use of technology was mostly stated in general terms. Technology tools used needed to be more explicitly described
8. Evaluation of implementation	3.1	<ul style="list-style-type: none"> • Evaluation findings were mostly not explicitly summarised. Instead a list of publications was provided requiring the reader of the learning design to abstract the research findings. • Most of the evaluation research focused on student perceptions
9. Designer(s) reflection	3.1	<ul style="list-style-type: none"> • Many designers had difficulty reflecting on the implementation of their learning design, emphasising student satisfaction measures rather than explaining what worked and/or didn't work
10. Advice/ guidance about reuse	2.2	<ul style="list-style-type: none"> • Reuse advice was the most poorly described of all description elements. The advice tended to lack vision about the potential of reuse in other contexts

is a condition for reuse. Other factors are likely to impact on reuse and adaptation beyond the quality of the learning design description. Further research with practitioners who have either reused or attempted reuse of learning designs could glean further understanding.

Furthermore, the utility of formalised notation systems for learning designs needs further scrutiny. Some studies have found that standardised approaches for documenting teaching practice can be problematic because different communities of teachers have different discourses (eg., de Freitas, Oliver, Mee, & Mayes, 2008). Learning design representations with an adaptable notation system may alleviate this concern but further research is required to confirm this contention.

Conclusion

This paper has reported an analytical study about what constitutes an effective learning design description based on an analysis of learning designs in an existing repository. The study contended that an effective learning design description comprises: a clear description of the pedagogy, some form of quality rating, and guidance or advice about how it can be reused. Six learning designs, from a repository of 32, were identified as effective learning design descriptions. High scoring learning design descriptions were characterised by detailed and complete descriptions of tasks, resources, supports and the implementation context. Low scoring learning design descriptions were characterised by lack of detail about the explicit learner engagements and activities, limited information about the linkages between supports, resources and tasks, lack of information about access to supports and tasks and a superficial description of pedagogy used. These six learning designs may now be redeveloped and investigated further in the quest to provide quality, reusable learning designs to support and improve teaching.

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