An Appreciation of Diverse Approaches to Learning Design in Higher Education

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Abstract

This chapter makes the case for acknowledging and appreciating the diverse paths that lead to the generation of designs for e-learning in Higher Education. It identifies and critically examines some of the tensions between current design practices in the higher education sector and those assumed by interoperability standards such as IMS Learning Design and learning objects. The likely imperatives of a more design-intensive model of e-learning for the organisation and culture of the academic workplace are considered and some simple practical techniques to support the generation of designs are described. The chapter introduces a proposal for the combination of pedagogic and design knowledge as a means for improving practice by promoting a collaborative multidisciplinary approach to help reverse the current dominance of technology. Finally, the chapter briefly outlines suggestions for further areas of interdisciplinary enquiry and development.

Keywords: E-Learning, Teaching, Pedagogy, Higher Education, Instructional Design, Learning Design, Creativity, Learning Objects, Interoperability, Education, Diversity, Design Studies, Design, Professional Development, Organisational Change.

Introduction

This chapter describes the wide range of largely informal approaches to developing designs for e-learning in higher education (HE) that exist and examines how they relate to the emergence of interoperability standards, particularly IMS Learning Design. This is contrasted to the situation in the distance learning, commercial and military training sectors where the abstraction, sharing and reuse of pedagogic designs and learning resources is comparatively well developed. In what might be described as 'mainstream' HE this kind of shared and formalised design-intensive activity is still relatively rare. This chapter aims to provide a critical commentary, from an evidence and research-based background, on current design practice in HE and the possible application and development of e-learning tools and interoperability standards to support improvement. The chapter argues that a multidisciplinary approach is needed to overcome the current e-learning implementation problems that are frequently reported by practitioners from a variety of backgrounds.

Before proceeding it is helpful to provide some background for readers not familiar with some of the more technical topics referred to in this chapter. IMS (2009) is one of several global organizations involved in developing educational technical interoperability standards Such standards are intended to make it possible for digital information to be shared more effectively and efficiently by those involved in education. A good source of further information are the briefing papers available from the web site for The Centre for Educational Technical Interoperability Standards (CETIS, 2009) in the UK.

The need to improve the quality of the design of the student learning experience in higher education is a longstanding issue and one that has been recognised by many influential educational authors including Biggs (2006), Ramsden (1992) and Laurillard (2002). For instance, the ambition for the 'Aligned Curriculum' in HE propounded by Biggs (2006) still remains a substantial challenge; where teaching aims, learning outcomes and assessment criteria are set in a coherent relationship with each other, supported by activities that facilitate the desired learning. So, questions relating to learning design also go straight to the heart of current major debates about quality and efficiency in higher education and learning. The case for taking design more seriously is made by the European E-LEN project (E-LEN 2004):

> *[The problem is] a failure of effective design (or a lack of any deliberate design) of the learning environment that leaves important dimensions of the learning experience at the mercy of outside forces that are unsupportive of the desired learning outcomes. (E-LEN, 2004, p. 10)*

Teaching in HE continues to be dominated by the traditional patterns of the campus based face-to-face model, which can exert a tenacious hegemony over any attempts to change it (Agostinho, Harper, Oliver,

Hedberg, &Wills, 2008). But, despite this, systems of HE teaching and education are also in a period of transition to meet the challenges posed by the need to supply quality flexible learning opportunities to a mass student population from increasingly diverse academic backgrounds.

The arrival of technologies associated with learning objects and the IMS Learning Design specification, together with their related concepts and methods, pose a different approach to current HE learning design practice. They also represent a different, often not fully articulated, educational philosophy (Friesen, 2004a) where organised design activities and reuse of content components plays a central role. To work in HE this requires a move away from the current dominant model of teaching in higher education of the individual campus-based subject specialist operating primarily in a face-to-face mode, towards a more collaborative multidisciplinary model capable of delivering flexible learning opportunities mediated by technology. This transition in teaching practice and associated design activities is likely to be different in extent and type depending on the subject discipline and local institutional context. The adoption of inclusive methods, tools and concepts that can help practitioners reflect upon, articulate, share, compare and develop their learning designs and experience is likely to be a key enabler of such a change in educational systems.

This chapter is grounded in the practical experience of the author in helping subject matter experts to design online courses and learning resources over several years at the University of Stirling, Scotland, and participation in research projects that examined practitioners dealing with reuse and redesign of resources as learning objects. The chapter also draws on involvement in an action research project at the University of the Highlands and Islands Millennium Institute, Scotland that explored issues surrounding the extension of a more flexible curriculum in a federated geographically remote institution. One of the outputs of this project was a guidebook for the re-design of courses and institutional structures to make best use of flexible techniques supported by e-learning technologies (Casey & Wilson, 2006). The chapter also includes inputs from the discussions and publications of the European UNFOLD project that brought together IMS Learning Design technical developers with teachers to discuss a wide range of issues involved in making usable software tools that teachers and institutions could use.

The chapter starts by reviewing some of the tensions between existing design practice in HE and the requirements of e-learning interoperability standards and identifies some important gaps in discussions about the creation of learning designs. The concept of a learning design continuum is then introduced, which can contain different types of representation and degrees of formalism. Next, some practical tried and tested approaches to generating learning designs are described. The discussion then goes on to combine some useful perspectives from the fields of pedagogic research and design studies. The chapter concludes with a discussion of how the topics covered may be integrated to provide a unified approach that is both broadly inclusive and supports diversity and creativity in e-learning design, and makes suggestions for further areas of work.

Tensions Between the Technical Community and Mainstream Education

The IMS Learning Design specification aims to be able to supply a vocabulary, which teachers using any pedagogical method can use to express their designs for teaching. The core of this vocabulary assumes that the learning/teaching process can be expressed in terms of people in specified *groups* and *roles* engaging in *activities* in an *environment* that contains appropriate *resources* and *services*, the terms in italics are part of the vocabulary. The aims for the specification are ambitious; to provide a common system of notation that can describe any pedagogic strategy in both human and machine-readable forms and it originated from previous work carried out by the Open University of the Netherlands into educational modelling languages (Koper, 2005). IMS Learning Design makes use of a theatrical metaphor with the stage play script providing a model for the notation system (Koper, 2005). The technical challenges involved in this have been considerable. Those involved in this work have acknowledged that

the usability of tools and systems for Learning Design are going to be crucial for success and it is fair to say that there is still a long way to go in this respect. The interest generated by this work in the educational and e-learning fields has been extensive and has also helped to encourage a wider reconsideration and exploration of how general learning design activities are conducted in mainstream education.

But, to date, educational institutions have proved remarkably resistant to change induced by e-learning technology and the hegemony of campus-based face-to-face teaching in many cases remains intact. This extract from the editorial of an e-learning research journal describes the situation:

> *Traditional e-learning, as managed in the past decade, has started to show some signs of crisis. From a pedagogical point of view, if we observe closely we can see the application of the Web technologies has not yet had a meaningful impact on education. E-learning has often been translated into a "teaching machine", in which one takes advantage only of the communication capabilities of the Net, using it as a mere transmission channel, similar to radio or TV i.e., the media used in the previous generation of distance education. Furthermore, most investments have been devoted to content authoring, and developing interoperability standards for content and virtual learning environments. Great economic investment have been made for Learning Objects (LOs) and for developing Learning Management Systems. The coupling between LO and LMS is a leit-motiv in every context of network learning, from schools to universities to the corporate sector.*
> *This way of interpreting e-learning is running into a crisis: the promised economic effectiveness of content re-use is often hard to demonstrate or it is limited to specific contexts, while a general feeling of discontent is arising. (Fini, 2007, p. 5)*

To understand this apparent impasse Friesen (2004) and Friesen & Cressman (2006) helpfully point out there is a set of important political and economic sub-texts connected to the proposed uses of technical standards and technologies in education that still need to be explored. This chapter takes the view that neglecting such 'soft' issues is a major cause of the problems cited above by Fini (2007). In this connection it is useful to differentiate between the characteristics of mainstream HE and those areas that are already embracing the technologies involved in interoperability standards as exemplified by learning objects and IMS Learning Design, and the implications of this difference for future development. At the moment those most involved in these technologies are the distance learning sector, the research community, aviation and military training providers. It is questionable to assume that an effective approach to e-learning in the mainstream is one that replicates the use of technologies and methods imported from these sectors. The experience of such specialist 'early adopters' cannot simply be projected onto the mainstream educational institutions. Such institutions do not function in the same way, their structures and the cultures of those working in them are not the same and their actual missions and purpose are very different. Teaching and learning in the mainstream is a far more messy, less controlled and contingent enterprise than in the military, the distance learning sector and aviation; where an 'industrialised' Fordist style workplace is the norm with a much greater investment in up-front design activities. In contrast, much of the main mode of university teaching production is pre-capitalist and dominated by the medieval communication tool of the lecture (Laurillard, 2002). Casey and Wilson (2006) suggest that what might be termed the 'political economy' of e-learning lies at the heart of the success (or otherwise) of incorporating technology into mainstream HE. This presents some difficult questions, both for the organisation of the present academic workplace and the underlying philosophies of e-learning innovators.

Implications for Institutional and Professional Change in Relation to E-learning Standards

To work at their best (in terms of quality and efficiency), many of the technologies related to e-learning effectively assume and require the redesign of the educational workplace. Pollock and Cornford (2000)

make the insightful observation that these technologies carry strong implicit organisational and business models. Friesen (2004b), gives a good description of these implicit models (including some of their military origins) in an often-referenced paper called *Three Objections to Learning Objects and E-Learning Standards* and calls for more research into this area, especially into an examination of their pedagogical, epistemological and ideological implications. Friesen & Cressman (2006) have also observed that the domains of education and learning can be best understood as being especially local, heterogeneous and contextual in ways that few other organised activities are. Similarly, Downes (2003) in an article entitled *Design, Standards and Reusability* makes the same points about the contextually determined nature of education and limits to the ideas of reuse and economy than can be expected in this domain as opposed, for instance, to the military sector.

In contrast to the situation described by Fini (2007) above, those initiatives that are addressing the contextual aspects of implementing e-learning, what may be termed the tricky realities of implementing the political economy of e-learning, are tending to have more success than those that do not. Support for this analysis comes from the work of the National Centre for Academic Transformation[4] (NCAT) in the USA, which administers large charitable grants to higher education institutions to improve the quality and efficiency of their educational provision with the use of information technology. The funding from the NCAT comes with tight conditions such as a ban on creating new learning materials and instead concentrates on re-designing the curriculum and introducing different work practices using relatively lo-tech approaches with positive results (Twigg, 2005). Similar work in the UK has found that sharing and reuse of learning resources works best when combined with the organised re-engineering of a curriculum and associated working practises. Boyle (2003) outlines some guidelines for authoring learning objects from a pedagogic point of view and provides a description of a mass deployment of learning objects to support undergraduates (approx 600) in computer science. In a later evaluation of the same initiative Bradley and Boyle (2004) report on encouraging results (less drop outs and higher exam scores). Even more dramatic results are recorded by Trayner (2002), with a very large decline in drop-out rates, after persuading lecturers to forego using their own notes and use a common set of learning materials in an electrical engineering courses.

The heart of the challenge posed by the political economy of e-learning is that a considerable number of teaching staff generally do not share and reuse learning resources and learning designs, instead they concentrate on preparing 'their' content to deliver to 'their' students (Koper, 2003). The teaching activity that is carried out is deeply embedded in an institutional context (almost in the 'bricks and mortar' of the institution) and is therefore difficult to share and abstract. In this pedagogic environment lecturers feel most at ease developing their own content and delivering it to their students. Conceptualising and abstracting learning activities for their students from such a rich working context is not a particularly common activity (Koper, 2003), and sharing these conceptions with colleagues is even rarer. As Allison Littlejohn (2003, p. 226) observes, *"Designing for reuse means designing with multiple users in mind and this is a new experience for most teachers in all sectors of education"*.

In the introduction to *Integrated E-Learning: implications for pedagogy, technology and organisation,* (Jochems, van Merriënboer, & Koper, 2004) the editors make the case for regarding the introduction of e-learning as not merely an addition to the existing method of instruction but as something that requires a fundamental redesign of the institution as an educational system. They envisage that this redesign has to address pedagogical, organisational, strategic and technological factors, this is clearly a long-term project but it does give a clear idea of the final destination envisaged by some e-learning innovators. These authors are based at the respected Educational Technology Expertise Centre at the Open University of the Netherlands. Such specialist distance learning institutions are already embracing the reorganisation needed to make best use of the technology. But, the question that needs to be borne in mind here is to what degree the experience of such early adopters can be replicated in the mainstream. In this connection Casey, Brosnan and Greller (2005) argue that one of the keys to understanding the emotional attachment of

lecturers to their own materials is that in many cases they have created them in the process of learning how to understand and teach their discipline. As such, they are crucial part of a lecturer's personal support system and contain their accumulated and embedded pedagogic and institutional knowledge, which in turn supplies cues for their teaching and design activities. These patterns of academic work and administration need to be understood and factored in by those involved in the development and improvement of e-learning design activities in HE. The mission-critical nature of the design processes that are required to effectively implement e-learning make the acquisition of collaborative design skills a key area to address. In this connection there is much to learn from a consideration of other fields of professional activity where design is recognised as a fundamental component.

The Learning Design Continuum

The developers working on the IMS Learning Design specification and associated tools have had, by necessity, to simplify their working problem domain space by assuming that the design process starts with the production of a formalised and structured design narrative. While convenient and necessary for technical developers this does not represent actual practice – a common tension in software projects. In fact, the requirement to produce a formalised and rather abstract design narrative (using a controlled vocabulary) was one that caused considerable difficulty to the mainstream educators involved with the European UNFOLD project that brought together teachers and the IMS Learning Design development community. Expecting teachers to be able to produce an abstracted narrative description (as required by IMS Learning Design) that uses a controlled vocabulary to choreograph and record the proposed interactions of learners, teachers, environments and resources over time and space with each other is a really serious challenge.

However, the useful thing about IMS Learning Design, from the point of view of this chapter, is its insistence on being able to produce a shareable and structured narrative that stands as a formal design document. The benefit of this is the ability to have a useful shared reference point for the production of design documentation. This can, in turn, support critical activities for improving the design skills in HE that are required to implement e-learning effectively including:

- Development of more reflective practitioners and institutions
- Changing the teaching model from individual to team (important for flexible learning)
- Improving the quality of the design of learning experiences
- Provide a context for identifying organisational factors that impinge on design

The problem with the use of a controlled vocabulary and other technical representations of design, such as Universal Modelling Language diagrams etc, was recognised during the discussions of the UNFOLD project. Out of these discussions came the acceptance of the need to recognise the less formal, rougher and more tentative conceptions of pedagogy that practitioners really use: 'primitives' and 'artefacts'– were the terms that emerged to describe these kind of conceptions (Griffiths & Blat, 2005). It was recognised that these 'primitives' may in turn become the building blocks of more elaborated and structured representations that may still be 'fuzzy', that lie midway between actual embedded practice and the more abstract and formalized narrative required to initiate an IMS Learning Design. This leads to the useful notion of a 'learning design continuum' as shown in Figure 1.

Primitives/Artefacts………………….Semi-Structured…………………….Formal

Figure. 1 The learning design continuum

The *IMS Learning Design Best Practice Guide* (IMS, 2009) describes the starting point of creating a design as an analysis phase that results in a structured narrative. As Griffiths and Blat (2005) point out, no

structure or methodology is recommended to support this activity. This is an important gap in current understanding about learning design in mainstream education – what needs to occur before a formal learning design can be produced. This is also a problem that concerns many other creative design professions and education can profit from the experiences and insights from the field of design studies. Of course, one of the potential benefits of IMS Learning Design is that it provides part of the solution to this problem itself by providing a common reference point at the formal end of the continuum in the form of a shared and structured vocabulary to do just that. Having such design formalisms is something that is important to aid communication and development in many professional fields, architectural drawings and engineering specifications being two examples.

The learning design language usage classification box in Figure 2 is inspired by Botturi, Derntl, Boot, & Figl (2006), and is a useful aid to help think about the purpose of a design and indicates that a design may well pass through all the four stages in this classification from (1) generative/reflective through to (4) finalist/communicative – i.e. from individual reflective use to a finalised and shared use. This is particularly useful in relation to categorising the types of communication needed to support the move from individual ways of working to a more collaborative team-based approach that a flexible e-learning curriculum requires. If this usage classification is superimposed onto the learning design continuum it results in a useful combined conceptual tool, shown in Figure 3. This tool can be used to help understand, categorise and describe different types of learning designs, their uses and how they might support a move towards team working (indicated by the arrow). The formal end of the continuum being defined by the narrative required to produce an IMS Learning Design.

Figure 2 Learning Design Usage Classification Framework

Primitives/Artefacts…………………….Semi-Structured……………………….Formal

Fig. 3 Learning Design Continuum Combined with Usage Classification

Bridging the Gap - Practical Approaches to Generating Learning Designs

The gap referred to in this section title is that between the informal personal ideas of practitioners and the more finalised communicative designs that are needed to support a shared design effort. As Stubbs & Gibbons (2008) observe:

> *Bridging this gap requires a process of externalising the designer's conceptual world. This externalisation may be expressed verbally, visually, or physically – with words, drawings, or models. (Stubbs & Gibbons, 2008, p. 34)*

The approaches in this section are based on experience of working with subject specialist teachers and helping them articulate and clarify their own, mostly internalised, pedagogic strategies in order to start representing them in a shareable way. Once they are externalised they can be reflected upon and when they are shareable, the teacher can discuss them with colleagues and develop them further.

Standard instructional and educational design wisdom is that after a period of analysis the aims, learning outcomes and assessment criteria etc. are developed with some rigour and then content is added. This is fine if the teacher can work in this way and has the skills to do so. However, the reality is that many teachers feel most comfortable working outwards from what they already know and do (the content – especially 'their' content, their own notes etc.). This perspective fits very well with taking a 'scaffolded' approach to developing design skills in mainstream teachers based on a cognitive apprenticeship model (Brown, Collins & Duguid, 1989). A good way of facilitating such an approach is to utilise communities of practice (Wenger, 1998), which is what two learning resources repository projects have done; the NDLR (National Digital Learning Repository) project in Ireland and the Merlot (Multimedia Educational Resources for Learning and Online Teaching) project in the USA have been pursuing this course with some success. In this scenario shared learning objects and learning designs become social objects that help mediate meaning and understanding between different parts of the same community and across the borders of different communities - such as between subject matter experts and media developers (Wenger, 1998; Conole, 2008).

Some of the design approaches described below (especially related to content) may seem obvious or banal to existing experienced designers, but it needs to be borne in mind that these are aimed at teachers who may never have articulated or shared a learning design before. The division between content and activity is fluid and one will lead to the other and vice versa. It is worth noting that in the Instructional Systems Design tradition it is also generally recognised that activities like needs analysis and requirements gathering can include a fair amount of iteration and serendipity for experienced practitioners – even if the output is a relatively short and abstract design statement. There are some striking parallels in the methods described below to knowledge elicitation and representation in the field of artificial intelligence. In this connection, the two most important factors are (i) of finding suitable representations and elaborating them (Wenger, 1987), and (ii) the importance of a rapport between the 'knowledge engineer' (the designer/facilitator) and the subject specialists in a team setting (Irgon, Zolnowski, Murray, Bellcore 1990).

Note: for those readers less familiar with the Instructional Systems Design (ISD) tradition Reigeluth (1999) provides an authoritative introduction to the changing nature of the ISD community that is useful for those coming to that area for the first time and Clark (2009) provides a comprehensive and accessible online resource base covering the subject and its history

Working on Content

Hierarchical Lists, Concept Maps, Mind Maps

Many subject experts find it difficult to separate teaching activity (and hence design) from the actual content itself. Some are prone to producing long texts for their students (often unstructured), which are in effect internal narratives. A useful first step in this situation is to get them to produce a hierarchical list of the constituent topics of a subject, this begins to break down the subject area into the main components that are linked in order of precedence in the subject domain – this is surprisingly useful. Of course not all domains fall into a neat hierarchical list, this is where mind maps and concept maps come in useful in helping to define the type of structure inside the subject area. Boyle (1997) presents useful advice on how to go about the structuring (and restructuring) of content to support the process of curriculum design. Often the structure of the domain will suggest an initial order for teaching the material – this needs to be tested later in the design process. At this stage the first draft version of what is to be covered and taught is obtained. As a general observation it is worth noting that the use of graphical representations, particularly design drawings, is greatly underused in this area (Stubbs and Gibbons, 2008).

Structured Writing

It can be very useful to supply some guidelines and house styles to promote and support structured writing. This is simply writing and formatting materials in such a way that the inner structure of the material is obvious to the other members of the team (and of course the students). It is very similar to the techniques used in 'traditional' correspondence courses. In this approach the lo-tech concept of a contents list is used to make the document structure apparent, by dividing the material into hierarchical 'chunks'. For this it is essential that the relevant heading and sub-headings appear in the body text of the study material as well; consistently formatted and well-named headings also act as useful 'prior organisers' for the reader. It is striking how such small factors can have a big impact – again this can help the teacher in conceptualising the structure of the course, this approach is recommended in a guide to designing for reuse produced in the UK (Casey and McAlpine, 2002)

Accessibility Issues

This is a common concern (and rightly so) although not always addressed coherently, the anxiety about this can be a useful lever in persuading teachers to organise their content in a clearer manner. The structured writing methods advocated above also produce more accessible web and text documents for screen readers (if standard heading styles are used). Developing content in layers as proposed below can also be a good basis for producing more accessible materials, as well as lightening the cognitive load on the authors by providing a useful incremental design framework.

Delivery Platforms, Bandwidth and Media Choices

Thinking about delivery platforms (both hardware and software) and bandwidth limits (the speed of a network connection) are good for helping to conceptualise students' situations and the choice of presentation modes available. It can be useful to develop content in layers (like an onion), with each layer adding more sophistication and presentational power (with possible implications for choice of platforms and bandwidth). This also provides an incremental way for subject matter experts and learning designers to engage with the extra cognitive load involved in translating their content and designs into different forms. A rough working rule of thumb that also represents the costs and skills of producing resources would be a hierarchy like that shown below:

Text > Diagrams (black and white schematic) > Colour Graphics/Photographs > Sound > Video > Animation > Interactive Multimedia

This layered approach to content design also makes it easier to identify and take account of important

cultural factors, amongst both teaches and students, which may affect the design process. These cultural factors are mediated in face-to-face campus based teaching in a relatively informal and rapid manner but can become much more explicit and problematical in online environments and this needs need to be factored into the design activities. For instance, in the textual form of the content the introduction of specialist terminology needs to be referenced to assumptions about prior learning. So do conceptions about what constitutes academic literacy – the assumed norms governing academic communication and interaction held by the teachers for that subject at that level. While in the visual media assumptions about visual literacy (such as in the use of diagrams) needs to be verified with the characteristics of the target student population and, where appropriate, additional explanatory resources provided.

Mode of Use

The intended context of use will affect the design of the content and related activities. Three useful modes to consider are:

- Face-to-Face / Classroom
- Distance / Online Learning
- Blended learning (a mix of the above two modes)

Often it is only possible to envisage activities by thinking about how the same content will be used in different modes – this is often enough to trigger a description of learning activities that can be associated with the content and, if needed, a redesign of the content.

Aims/Publicity

A useful exercise to go through is to examine the existing aims/purpose of the course with a view to clarifying them, especially when converting a campus-based course to flexible online delivery. Such statements are often drafted in a rush for a validation committee and can be difficult to understand – both for prospective students and other teachers – and are often remediated in a campus setting. But remediation in an online setting is much harder, so writing the aims/purpose with some rigour to be as clear as possible is one of the most important design tasks and should be done early on in the process. Good support tools to help in this process are the stock questions of journalistic enquiry such as: What is this about? Who is this for? How will it benefit the student? When does it run? How is the teaching conducted? What is being taught? How is assessment carried out? What is special about this course i.e. what is the selling point to students? Clarifying the answers to these questions can be a great help in preparing clear and meaningful learning outcomes – it is an iterative process. A useful side product of this is that it also produces good 'copy' for marketing the course. Another useful benefit of this approach is that it helps to make sure the public descriptions of the course do not 'drift' away from the internal validation documents and vice-versa.

Two Design 'Classics' for Educational Content Developers

It would be remiss not to mention in this section two design guides (that are still in print) relating to content development, one from the field of commercial publishing design and the other from the distance-learning sector. *The Non-Designer's Design Book: Design and Typographic Principles for the Visual Novice* by Robin Williams (1994) is an excellent and very readable introduction to the design of documents and use of typography, the principles described also have much to benefit the design of online documents and websites. As text documents in one form or another constitute the great bulk of academic communication and word-processing is within the skill set of most teachers, development in this area will provide a quick and high payback in terms of improvement in content design. Derek Rowntree, a professor of educational development at the Open University in the UK, has produced many books and guides about learning. In the context of this chapter his action-guide book *Preparing Materials for Open, Distance and Flexible Learning* (Rowntree, 2002) is a guide that all e-learning designers should consult,

he shows just how much can be achieved with a principled and lo-tech approach. It is interesting to note that both Rowntree (2002) and Williams (1994) advocate creating a design library or scrapbook in which to keep noteworthy designs for future reference and inspiration, a practice also used in many design and art disciplines.

Working on Activities

Organisational Issues – Encouraging a Systems Approach

Teachers are very influenced by their institutional context and it strongly affects their designs. When making the move to e-learning they need to take into account aspects of the organisational context that affect their design decisions, this requires relating to their own institutions in a more analytical manner. In a case study Postle et al (2003) gives a striking account of having to work around the limitations of the administrative systems in an Australian university when introducing e-learning. Issues such as delays in registration and hence access to an e-learning system are much more critical in an online scenario than a face-to-face one, common workarounds are to have separate registration procedures, temporary log-on credentials and sending the first few weeks worth of materials on CDROM or in print to ensure students can get started. This all connects to the closely related areas of 'customer relations and satisfaction' that more and more institutions and teachers are having to factor into their activities. The development of shared organisational models to facilitate a systems approach to identifying these kind of contextual factors in e-learning design activities is likely to prove useful, Casey, Proven, & Dripps (2006) introduce an adaptable visual model intended for such applications.

Teaching Aims, Learning Outcomes and Assessment Criteria

Getting these factors right continues to represent a longstanding challenge in HE, as observed by Ramsden (1992) and Biggs (2006) and forms the basis of any good quality learning design. Although e-learning is relatively new in HE it involves elements of continuity as well as discontinuity with the past, this being a case in point. Jennifer Moon has written a useful practical guide to this difficult process, *The Module and Programme Development Handbook* (Moon, 2002). The outcomes-based approach to design represents a difficult task for many teachers precisely because it calls for a fair degree of abstraction, precision and formalism in expression. Because of this, it represents an essential precursor to creating a formal learning design narrative and as such it occupies a pivotal position on the learning design continuum, as represented in Figure 4.
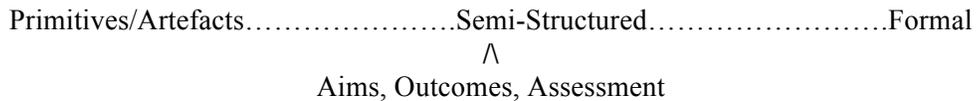
Primitives/Artefacts………………….Semi-Structured……………………Formal

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Aims, Outcomes, Assessment

Fig. 4 Aims, Outcomes, Assessment in the learning design continuum

Figure 5 represents a module design development model based on the work of Moon (2002) that stresses the iterative aspect of the design process; note that the term 'level descriptors' are a small predefined set of disciplinary exemplars set by a UK government agency to help guide development. It is also worth noting the primary input into this process is the creation of the Aims of the module, as described above. The outputs of this development cycle (learning outcomes, assessment criteria and methods and the teaching strategy) become an essential input to the learning design process and are an essential prerequisite to the creation of a formal learning design document.
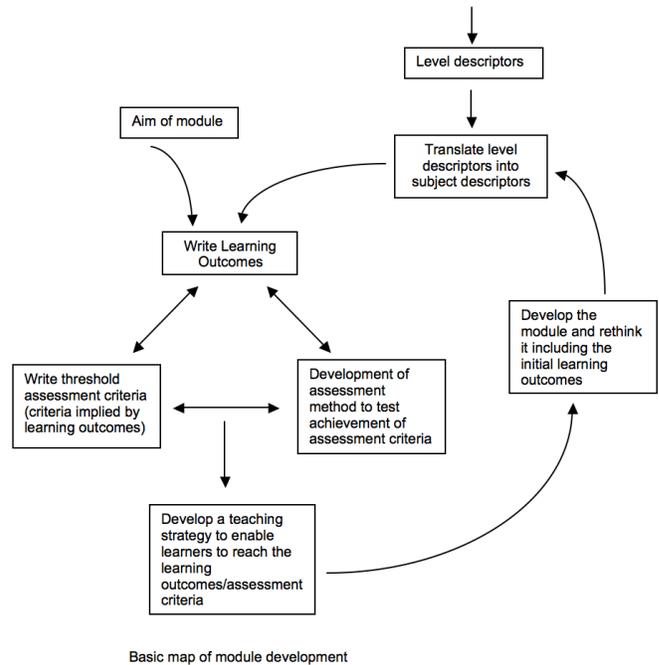
Basic map of module development

Figure 5 Module Development Model

Journalistic Enquiry Mapped to IMS Learning Design

The usefulness of adopting the questions of journalistic enquiry has already been referred to above in the context of writing the aims of the course. The same questions can also be asked about the design of the course activities. A tool to support and record the outcomes of this process is shown in Figure 6. This kind of approach and tool can be useful for teachers to conceptualise what it is they think the student (or the teacher) might be doing at any point in the course. Larger cells will allow more detail and this can be accomplished by decreasing the number of rows in the grid. Another useful aspect of templates such as this is that they begin to introduce some of the abstractions needed to create a formal IMS Learning Design narrative. For instance the roles of teacher and student are represented, as are the learning outcomes, the resources needed, the type of environmental services used, the parts of the knowledge domain involved, and relations to assessment activities. This type of representation could also be used at different levels of granularity from an entire programme through to a module and down to an individual lesson, thus giving a common lo-tech 'vocabulary' and expressive framework to a team. This approach also fits well with the type of basic design visualisation tools advocated by Sloep, Hummel, & Manderveld (2005).

	A Teacher/tutor activity	B Student activity	C Teaching and learning materials and resources	D Teaching topic, concept, knowledge, etc	E Learning outcomes (whole or partial) supported	F Formative or summative assessment	G VLE service – or classroom requirements: content delivery, discussion, chat, private mail, test, share files etc
1							
2							
3							

Figure 6 Blended learning template

Online Tutoring and Student Activity Design

The highly successful guide books by Gilly Salmon (2001; 2006), *E-Moderating: The Key to Teaching and Learning Online* and *Etivities: The Key to Online Learning*, are ideal for development in this area and show the demand from teachers for clear, accessible and well written guidance to support their development. This also demonstrates that some of the experience and techniques from the distance-learning sector can be imported into the mainstream; Gilly Salmon previously worked at the Open University. Both Salmon (2001: 2006), and Rowntree (2002) adopt similar approaches to offering guidance to practitioners, especially in the use of case studies and practical exemplars that give a feeling of authenticity. Both writers also take it as a given (and advocate) that the design of the programme of instruction will have considerable time devoted to it beforehand and that this more design-intensive background provides the context for their advice about the design of content and activities. The success of these two writers' books also indicates that a number of important factors are particularly valued by practitioners in regards to sources of support:

- Compendium style training resource, i.e. a comprehensive but brief account of a subject
- Accessible conceptual models such as Salmon's 5 stage model
- Access to quick reference material for Just In Time Learning (JITL)
- Enduring appeal of paper-based resources
- Case-based 'stories' provide authenticity that teachers can relate to

Graphical Tools

These kinds of tools are relatively underused but increasing interest is being shown in this important visual aspect of learning design and a useful handbook devoted to the subject was published in 2008 (Botturi and Stubbs, 2008). The ability of such visual tools, from pen and paper to more sophisticated software, to help practitioners visualise their designs is an important factor that is recognised in other design-intensive professions. However, it is not uncommon for some academic teachers to be uncomfortable with visual tools for learning design; there are strong cultural factors behind this that

Stubbs & Gibbons (2008) identify:

> *We live in a world, especially in academia, overshadowed by words. Lockard (1977) observed that, 'Our cultural heritage is dominated by a linear, verbal, and 'rational' tradition which can inhibit the use of drawing in design.' The implication of this tradition is a belief that decisions are made rationally (meaning in the mind verbally), and drawing is merely an act of the hand printing the decisions out. (Stubbs & Gibbons, 2008, p.37)*

In a techno-centric field, such as is currently constituted by much e-learning practice, it can be hard to make the case for lo-tech solutions such as the use of pen and paper. However, Hokanson (2008) provides powerful arguments for the important and central role that pen and paper techniques continue to play in the design process in other professions. It is the immediacy and control of the hand drawn-medium of paper that is unmatched by any other current technology and provides the least resistance to the externalization of creative ideas both for individual reflection and for sharing. For these reasons it makes a great deal of sense to deliberately include graphical tools in the repertoire of learning design activities and to make a special point of using freehand drawing to release creativity and act as a communicative tool. Another good reason proposed for using drawings and graphics in design is that it engages a wider set of cognitive faculties in both the designer and their audiences, according to Dual Coding Theory (Pavio, 1986) this greatly increases the chance of understanding and encoding into the memory.

Practical Approaches in Action - a mini case study

Late in 2000 the author of this chapter was involved in developing a pilot postgraduate module in quality management for professionals involved in the provision of a wide range of social services. The module was aimed at those in managerial positions and contained a considerable amount of emphasis on the personal and organisational development required to effectively maintain and improve quality in what were often very challenging environments. The module development exercise had very little official resources devoted to it and one part-time subject expert was allocated to the development who had no prior experience of e-learning. The author was directed to work on the development and held initial meetings with the expert and was able to establish a good working relationship, an important success factor as already observed. The expert had a great deal of knowledge and work experience in this area and took a strongly principled approach to the teaching of the subject as well as a empathetic teaching style that concentrated on active student learning.

The work began by the expert creating lots of content for the students to read and to provide the basis for interactions between the students. The first problem with this was that there was far too much content to be covered in the available time, this is a common issue in HE teaching and has been well described and discussed by Biggs (2006). This is also a tendency in some teachers who are coming to e-learning for the first time; they try to compensate for not being physically there with their students by giving them more content. A second problem was that the content produced had little structure or internal organisation; it was very much an externalisation of an internal dialogue. The next step was to persuade the subject expert to reduce the amount of content (by about half) and to structure the content by the use of section headers and sub headers, this worked very well but the expert found it a challenge initially. The author also encouraged the subject expert to try to envisage the situation of the students when creating content and devising activities and introduced a simplified version of the blended learning template help with this. The next step was to refine and edit the content and the activities, which entailed a considerable amount of work including the 'chunking up' of subsections of the content and allocating a consistent numbering scheme to the heading and sub heading titles. The chunking and numbering scheme was considered necessary as the module contained a large number of student activities that were specifically referenced to items in the content created by the expert that the students would need to refer to easily in their online activities.

The next stage was to consider the study mode for the course (blended or wholly online) and the administrative aspects of organising the student cohort through the college administration systems. The author suggested that the course be offered with a three day face-to-face induction to build up community spirit and trust, to check on basic IT skills and provide training on the use of the VLE systems, this was agreed. The author knew through previous experience that the time taken to register 'non-traditional' students in the college administration systems was likely to prevent them getting the logon credentials they needed to gain timely access to the VLE (this did in fact turn out to be the case) so temporary accounts were created. Another part of the solution was to provide the students with copies of the course content on CDROM in Adobe Portable Document Format (PDF) before the course started so they could get started on their readings without having to enter the VLE – this helped to assuage anxiety in some of the students. In addition, the VLE and IT skills training materials were also provided on paper at the induction session.

The module got off to a good start and the induction session proved to be a real success and built up enough trust and goodwill to help the students work through the course and discuss their own working situations. The VLE system recorded intense levels of student activity and interaction (the highest in the college up to that date) and it was obvious that a real learning community had developed; the student evaluations of the module were also very high. The knowledge and enthusiasm of the expert was an essential factor in this success, but so to was the shared preparatory work (the design thinking) that went into the module development. The experience of creating this pilot module, in turn, formed the basis of a successful bid by the college to a UK government department to supply training to the residential care sector, resulting in a substantial revenue stream. When the expert was asked at a review meeting what was the single most important thing he had learned from the experience of developing the module he replied, "Structure! Structure! Structure!"

Improving Design Skills

Useful Lessons from Teaching Theory

Biggs (2006) and Ramsden (1992) both make the point that everyone has an implicit personal theory of teaching and learning and that the first step in the process of improvement is to start to externalise these internal conceptions in order to change them. In this section useful insights are introduced from teaching research to serve as a foundation to build upon. In his influential book, *Learning to Teach in Higher Education,* Ramsden (1992) outlines three theories of teaching in HE that co-exist and build upon each other in a hierarchical manner. They also nicely represent the stages a university teacher progresses through as their pedagogic expertise improves, as well as providing useful ways of analysing the proposed and actual uses of technology to support teaching. These three theories see teaching as concerned respectively with:

1. Delivering content
2. Organising and supervising student activity
3. Teaching as adapting to circumstances and context in order to make student learning possible

Theory 1: Teaching as Telling or Transmission

The 'teaching as telling' scenario is consistent with the 'subject specialist' model of teaching that has historically dominated HE. The experience of students in this kind of environment is often unsatisfactory. Typically a student on a course will pass through the hands of different lecturers all teaching from their own notes, not working as a team from the same 'script'. This has the effect of fragmenting the learning experience and subject matter, it also places a higher load on the student than is necessary and presents obvious barriers to 'non-traditional' students who are not already familiar with this type of culture.

Theory 2: Teaching as Organising Student Activity

As Ramsden (1992) observes, the transmission model of teaching in HE (although still widespread) has in public discourse tended to be supplanted by concern about managing and directing student activity. Although this discourse sometimes acts as a 'cover' for the continuation of the transmission model it is a step in the right direction. Here the concentration is on what the student does, not on what the teacher does – or the content delivered.

Theory 3: Teaching as Making Learning Possible

At this third level teaching is an activity that includes delivering content and organising and supervising student activities but is also fundamentally concerned with learning about teaching itself and applying the lessons learnt to new students and situations. In this view teaching is a constantly evolving, reflective, and reflexive process –in cognitive apprenticeship terms a sign of mastery of a discipline. To lay the foundation for working at the third-level Ramsden (1992) is clear about the necessity for planning and incorporating the teachers' knowledge about common problem areas:

> Note that this theory is very much concerned with the content of what students have to learn in relation to how it should be taught… a teacher who uses this theory will recognise and focus especially on the key issues that seem to represent critical barriers to student learning. The content to be taught, and students' problems with learning it, direct the method he or she uses. (Ramsden, 1992, p. 114)

It is at this level (in a hybrid human-machine system) where the abilities of the human teacher can be used to best effect – the remediation of student knowledge. These three theories combined also corresponds closely to Laurillard's (2002) influential conversational model of HE teaching which also makes a number of useful recommendations for media choice and organisational restructuring.

Useful Lessons from the World of Design

The Nature of Design Knowledge

De Corte (1990) gives a description of the nature of the knowledge needed to underpin expertise in a domain that is useful to frame a discussion about the nature of e-learning design skills and how to improve them:

a. The flexible application of a well-organised domain-specific knowledge base, involving concepts, rules, principles, formulae and algorithms etc.
b. Heuristic methods.
c. Metacognitive skills
d. Learning strategies that learners engage in to acquire the preceding types of skills.

Much of what is described above from teaching theory fits into the first and last categories of de Corte's framework (the theoretical knowledge and learning strategies needed to gain design skills). The rest of this section looks towards how the field of design studies may help in developing the heuristic and metacognitive aspects of design expertise. Donald Norman (1999) has written a classic account about the profession of design in *The Design of Everyday Things*, there are some important ideas in this text in relation to understanding the nature of the design knowledge of teachers. Norman makes a strong and useful case for the understanding the situated nature of such knowledge:

> A major argument [in this book] is that much of our everyday knowledge resides in the world, not in the head. This is an interesting argument and, for cognitive psychologists, a difficult one. What could it possibly mean for knowledge to be situated in the world? Knowledge is

interpreted, the stuff that can only be in minds. Information, yes, that could be in the world, but knowledge, never. Well, yeah, the distinction between knowledge and information is not clear. If we are sloppy with terms, then perhaps you can see the issues better. People certainly do rely upon the placement and location of objects, upon written texts, upon the information contained within other people, upon the artefacts of society, and upon the information transmitted within and by a culture. (Norman, 1999, p. xi)

It is precisely this situated, embedded, 'craft' nature of learning design in mainstream HE that needs to be comprehended in order to both understand and improve it.

Product Design

Those who design products experience many of the same problems as e-learning designers. They have to juggle with many conflicting elements in order to resolve the design problem including; purpose, resources, costs, the users, as well as more philosophical questions such as cultural values and aesthetics. It is useful to begin to explore what links there might be between the two professions. Achille Castiglioni was one of the most influential designers of the 20th century and taught Industrial Design at Milan Polytechnic. He is credited with many classic design creations and is cited in numerous design courses and handbooks. He is also famous for the many aphorisms and proverbs he used to describe his design methods. This particular use of language to express complex domain-specific concepts is typical of the existence of a community of practice - joint enterprises that create a shared repertoire (Wenger, 1998). With Castiglioni it is possible to get an insight into how a community makes special use of language (and drawings etc.) to communicate internally; it allows practitioners to communicate to others at different levels of ability (including novices). In contrast, Beetham (2004) reports a relatively underdeveloped use of language and vocabulary in relation to descriptions of learning design in the mainstream educational community.

Looking at Castiglioni's statements it is clear he is operating at a meta-design level. What might be taken from this that may be of use in the field of learning design? For instance, he is credited with the viewpoint that if one is going to the trouble of designing something then the exercise must restructure an object's function, form and production process, and applied this maxim to every work that he produced. Castiglioni described this process as *"Start from scratch. Stick to common sense. Know your goals and means"* (Antonelli, 1997, p.1). How might this guidance be translated into the domain of learning design and objects? One useful interpretation might be (sentence for sentence):

- Start by identifying the learning needs as clearly as you can in terms of the problem, the learners and the context; don't try to reuse existing content and designs before doing this (a common problem), in fact – reuse last.
- Approach the design in terms of teaching aims and learning outcomes and take good time to develop the learning outcomes, from there develop the assessment criteria and methods in some detail.
- Return to check that the learning needs are correct, see if the design so far fits and adjust it according to the means and resources available.

Design Patterns

There is a need to find ways to mediate between the informal and situated designs of the mainstream and the more formalised design narratives needed to encourage wider sharing. One promising candidate is through the use of the concept of learning design 'patterns' (Bartoluci, Goodyear and Retalis, 2004). For the purposes of this chapter a design pattern can be described as being a concise and accessible summary of a more complicated design instantiation. It is no coincidence that the use of patterns in this way emerged from the design-intensive profession of architecture (Alexander, 1979). The European E-LEN

project (E-LEN, 2004) proposed a typical structure of a learning design pattern as follows:

- a name for the pattern
- a description of the problem/activity
- the context
- the forces and elements that play a role in coming to a solution
- the solution itself expressed succintly in terms of activities and resources etc.

It would make sense for learning designs and learning objects to be filed in an online digital library together with their summary 'pattern' to help other teachers assess the design and the objects. The attraction of the pattern approach is that it provides an accessible shorthand summary that suggests a solution to the user who can then adapt elaborate upon it in their own working context. The actual detailed designs and learning objects that the pattern is connected with may or may not be used in this process. The act of creating such simple structured patterns is also a good cognitive support tool to help designers to reflect upon their designs and externalise them in a shareable manner. McAndrew, Goodyear and Dalziel (2006) provide a good explanation of both patterns and their possible applications to support learning design activities in the future.

Directions for Future Work and Conclusions

HE institutions are facing the challenges of delivering more flexible learning opportunities to greater numbers of students from more diverse academic backgrounds within limited budgets while maintaining and improving quality. In this situation, e-learning technologies and methods are increasingly being turned to in order to meet these challenges. To be effective, e-learning in HE will need to evolve into a more design-intensive process than it currently is, with accompanying changes in the academic workplace to be economically viable. One direction for change that many commentators and researchers foresee and recommend is a move towards a multidisciplinary team approach for the design and development of programmes of learning, a key component in this process being the increased sharing, reuse and adaptation of learning resources and designs. The type and degree of this change is likely be determined by factors such as disciplinary subject traditions, departmental structures and budgets and institutional cultures.

The field of industrial product design is likely to be useful in helping to inform the development of effective e-learning designs and support tools and methods. This discipline often has to take a creative problem solving approach to the redesign of products caused by changing markets and the introduction of new technologies and working methods; higher education finds itself in just such a situation. Readers may be uncomfortable with the mass industrial production analogy, but in many ways HE institutions have already drifted into becoming de-facto mass educational providers but without the benefit of a rational redesign of the workplace to make the best use of technology combined with educational research. This raises some fundamental questions about the nature and purpose of higher education that need to be addressed, Goodyear (2001) stresses the need to clarify such basic philosophical questions in order to avoid the confusion and ineffectiveness described earlier by Fini (2007).

It needs to be remembered that the adoption of technology does not have to be inevitably driven by technocentric factors or commercial rhetoric. In this respect, the 'socio-technical' approach to designing systems to support human work with technology pioneered by Mumford and others (1995) has much to offer and can be seen in recent work on design and usability, such as that of Norman (1999), Neilsen (2000) and others. There is also a large research derived knowledge base concerned with adapting technology to effectively support those involved in knowledge working and with information which should provide useful frameworks for the development of methods and tools to support learning design activity in HE (Sharples, 2006).

In this chapter the case has been made that it is not necessary to abstract and formalise the existing informal knowledge of teachers before it can be shareable or useful. Often it is precisely these informal 'craft' descriptions of knowledge, which are found valuable by others because they are accessible without being alienating (Macdonald, 2006). This is an important point to take on board for those involved in activities to support the development of design skills in mainstream HE. Hokanson (2008), discussing graphical tools for instructional designers, provides good advice on how to support such creative development:

> *What is not needed is a canned set of symbols, like logos, icons, templates or emoticons, but a broad based development of representational or generational skills: skills at conceptualising, summarising, editing, communicating, organising, ordering and structuring. (Hokanson 2008, p.88)*

Similarly, in the design-intensive profession of architecture it is recognised and understood that there is also a parallel and longer tradition of what is called 'vernacular' design, which has developed to respond directly to local conditions to make best use of available resources as well as expressing cultural values. In their design activities architects often aim to have a 'dialogue' with this vernacular design tradition and in turn are influenced by it. Likewise, it is important to appreciate the veracity of teachers' conceptions about learning designs and their descriptions of them. An appreciation of this vernacular design tradition is particularly important for educational and technical researchers who, understandably, need to employ a more specialist and precise vocabulary with their peers but which is often found obscure and rebarbative by teachers. In this connection the work of researchers and authors like Salmon (2001: 2006), and Rowntree (2002) suggests that there is an important role for applied and action researchers to act a nexus between 'high' research and practice.

Much research interest and work has been occurring in the area of e-learning design with a number of ambitious software tools and research projects being proposed and developed to help solve the problem of generating, sharing and using learning designs; what might be termed top-down approaches. However, it is also worth pursuing parallel bottom-up approaches that seek to address the issues raised in this chapter (Sodhi, Miao, Brouns & Koper 2007). Effective solutions to the problem of developing design skills in mainstream HE will need to recognise the diversity of ways people deal with their design tasks, often strongly influenced by contextual factors. This implies the need to work outwards from academic teachers' existing conceptual and skills bases, to support this a cognitive apprenticeship approach to structuring their development is proposed. A natural adjunct to this approach is to use and develop communities of practice to situate such skills and knowledge within. A number of different tools, services and resources are likely to be required that reflect the diversity of contexts and working styles, as is the case in many other design disciplines. In this connection, it is best to think about how to create design environments (both online and lo-tech) that are 'convivial' to the production of effective learning designs (Illich, 1973). The development of such learning design support environments should be strongly linked to the study of creative design activities as well as research into the human-centred design of socio-technical systems that can effectively support those involved in such tasks.

Summary

This chapter has looked at developments in e-learning design in relation to a background of change in the HE sector and identified some of the tensions and gaps in current discourse. The differences between existing practice and that required by e-learning interoperability standards like IMS Learning Design have been examined and contrasted. The economic aspects of design choices have been touched upon and linked to implications for change in the underlying business model and organisation of the academic workplace The concept of a learning design continuum has been introduced together with the importance of recognising diversity in the methods used by practitioners in developing designs and representing them.

Useful perspectives from research into teaching and learning, and the study of design have been combined to inform the discussions and proposals for improvement. The importance of recognising learning design as a form of human creative problem solving activity has been suggested and links to the discipline of product design have been indicated as a positive area for further exploration. The chapter has concluded with a proposal to take e-learning design in HE forwards by recognising diversity in practice and using the research knowledge bases from the fields of pedagogy, design and socio-technical workplace studies to support future development.

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References

Agostinho, S., Harper, B., Oliver, R., Hedberg, J., & Wills, S. (2008). A Visual Learning Design Representation to facilitate dissemination and reuse of innovative pedagogical strategies in University Teaching. In Botturi, L., & Stubbs T. (Eds.), *Handbook of Visual Languages for Instructional Design: Theories and Practices*. Hershey, PA: Information Science Reference.

Alexander, C. (1979). *The Timeless Way of Building*. New York: Oxford University Press.

Antonelli, P. (1997). Curator's Essay. In *Achille Castiglioni: Design!* (A retrospective of the Italian architect and industrial designer), The Museum of Modern Art, New York. Retrieved July 27, 2009 from http://www.moma.org/exhibitions/1997/castiglioni/index.html.

Beetham, H. (2004). Review: developing e-learning models for the JISC Practitioner Communities. JISC. Retrieved July 27, 2009 from http://www.elearning.ac.uk/resources/modelsreview

Biggs, J. (2006). *Teaching for quality learning at university: what the student does*. Maidenhead, United Kingdom: Open University Press.

Botturi, L., Derntl, M., Boot, E., & Figl, K. (2006). A Classification Framework for Educational Modeling Languages in Instructional Design. In *Proceedings of the Sixth International Conference on Advanced Learning Technologies* (ICALT2006) (pp.1216-1220). Los Alamitos, CA: IEEE.

Botturi, L., & Stubbs T. (Eds.) (2008). *Handbook of Visual Languages for Instructional Design: Theories and Practices*. Hershey, PA: Information Science Reference.

Boyle, T. (1997). *Design for Multimedia Learning*. Hemel Hempstead: Prentice Hall Europe.

Boyle, T., (2003). Design principles for authoring dynamic, reusable learning objects. *Australian Journal of Educational Technology*, 19(1), p46-58. Retrieved July 27, 2009 from http://www.ascilite.org.au/ajet/ajet19/boyle.html

Bradley, C., & Boyle, T. (2004). Students' use of learning objects. *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*, 6(2), Wake Forest University, USA. Retrieved July 27, 2009 from http://imej.wfu.edu/articles/2004/2/01/index.asp

Brown, J., S., Collins, A., & Duguid, P. (1889). Situated Cognition and the Culture of Learning, Educational Researcher, 18 (1), 32-34.

Casey J., Greller W., & Brosnan K., (2005). Prospects for Using Learning Objects and Learning Design as Staff Development Tools in Higher Education. In Kinshuk, Demetrios Sampson, D., Isaías, P. (Eds.), *Cognition and Exploratory Learning in Digital Age, CELDA 2005, 14-16 December 2005*. Porto, Portugal: IADIS.

Casey, J. & McAlpine, M (2002). *Writing and Using Reusable Educational Materials: A beginners guide*. JISC Centre for Educational Technology Interoperability Standards. Retrieved July 27, 2009 from http://zope.cetis.ac.uk/groups/20010809144711/FR20020507112554

Casey, J., Proven, J., Dripps, D. (2006) Modeling Organisational Frameworks for Integrated E-Learning: The Experience of the TrustDR Project. In *Proceedings of the Sixth International Conference on Advanced Learning Technologies* (ICALT2006) (pp.1216-1220). Los Alamitos, CA: IEEE.

Casey, J., Wilson, P. (2006). A Practical Guide to Providing Flexible Learning in Further and Higher Education. Gloucester: Quality Assurance Agency for Higher Education. Retrieved July 27, 2009 from http://www.enhancementthemes.ac.uk/themes/FlexibleDelivery/publications.asp

CETIS, (2009) *CETIS briefings on e-learning standards*. Retrieved July 27, 2009 from http://zope.cetis.ac.uk/static/briefings.html

Clark, D. R. (2004), A Brief History of Instructional System Design. Retrieved July 27, 2009 from http://www.nwlink.com/~Donclark/history_isd/isdhistory.html

Conole, G. (2008). Capturing practice: the role of mediating artefacts in learning design. In Lockyer L., S. Bennett, S., Agostinho, and B Harper (Eds.), *Handbook of Research on Learning Design and Learning Objects: Issues, Applications and Technologies*. Hershey, PA: Information Science Reference.

de Corte, E. (1990). Learning with New Information Technologies in Schools: Perspectives from the Psychology of Learning and Instruction, *Journal of Computer Assisted Learning*, *(6) pp69-87*.

Downes, S. (2003). *Design, Standards and Reusability.* Retrieved July 27, 2009 from http://www.downes.ca/post/54.

E-LEN project (2004). Design expertise for e-learning centres: design patterns and how to produce them. E-LEN project workpackage deliverable. Retrieved July 27, 2009 from http://www2.tisip.no/E-LEN/documents/ELEN-Deliverables/booklet-e-len_design_experience.pdf

Fini, A. (2007). Editorial, Focus on E-Learning 2.0. In *Journal of e-Learning and Knowledge Society: The Italian e-Learning Association Journal*, Vol. 3, n.2.

Friesen, N. (2004a). *The E-Learning Standardization Landscape*. Canada: Cancore, Athabasca University.

Friesen, N. (2004b). Three Objections to Learning Objects and E-learning Standards. In: McGreal, R. (Ed.). *Online Education Using Learning Objects*. London: Routledge. pp. 59-70.

Friesen, N., & Cressman, D. (2006). The Political Economy of Technical E-Learning Standards. In A. Koolhang & K. Harman (Eds.), *Learning Objects: Theory, Praxis, Issues, and Trends*. Warsaw: Informing Science Press. Pp. 507-526. Retrieved July 27, 2009 from http://learningspaces.org/n/papers/standards_ant.doc

Goodyear, P. (2001). *Effective networked learning in higher education: notes and guidelines*. Lancaster University: CSALT. Retrieved July 27, 2009 from http://csalt.lancs.ac.uk/jisc/guidelines.htm

Griffiths, D. & Blat, J. (2005). The Role Of Teachers In Editing And Authoring Units Of Learning Using IMS Learning Design. In *International Journal on Advanced Technology for Learning, Special Session on "Designing Learning Activities: From Content-based to Context-based Learning Services*, volume 2, issue 4, October 2005. Retrieved July 27, 2009 from http://dspace.ou.nl/handle/1820/586

Hokanson, B. (2008). The Virtue of Paper:Drawing as a Means to Innovation in Instructional Design. In Botturi, L., & Stubbs T. (Eds.), *Handbook of Visual Languages for Instructional Design: Theories and Practices*. Hershey, PA: Information Science Reference.

Illich, I. (1973). Tools for Conviviality. London: Harper & Row.

IMS, (2009). *IMS Learning Design Best Practice and Implementation Guide*. Retrieved July 27, 2009 from http://www.imsglobal.org/learningdesign/ldv1p0/imsld_bestv1p0.html

Jochems, W., van Merriënboer, J., & Koper, R., (2004). Introduction. *Integrated E-Learning: implications for pedagogy, technology and organisation.* Abingdon: Routledge and Falmer

Koper, R. (2003). Combining reusable learning resources and services with pedagogical purposeful units of learning. In Littlejohn A. (Ed*.) Reusing On-line Resources: a sustainable approach to e-learning*. London: Kogan Page.

Koper, R. (2005). An Introduction to Learning Design. In Koper, R. & Tattersall, C. (Eds). *Learning Design: a handbook on modelling and delivering networked education and training.* Berlin: Springer.

Laurillard, D. (2002). *Rethinking University Teaching*. Abingdon: Routledge and Falmer

Littlejohn, A. (2003). An incremental approach to staff development in the reuse of learning resources. In Reusing Online Resources: a sustainable approach to e-learning. In Littlejohn A. (Ed*.) Reusing On-line Resources: a sustainable approach to e-learning*. London: Kogan Page.

MacDonald, J. (2006). Email correspondence. E-learning coordinator, Open University in Scotland.

McAndrew, P., Goodyear, P., Dalziel, J. (2006). Patterns, designs and activities: unifying descriptions of learning structures. In *International Journal of Learning Technology*, vol 2; numb 2/3, pages 216-242. Switzerland: Interscience Enterprises Ltd.

Mumford, E. (1995). *Effective Systems Design and Requirements Analysis: The ETHICS Approach*. Basingstoke: Macmillan.

Neilsen, J. (2000). *Designing Web Usability*. New Riders

Norman, D. (1999). *The Design of Everyday Things*. Cambridge, Massachusetts: MIT Press.

Pavio, A. (1986). *Mental Representations*. New York: Oxford University Press.

Postle G. (2003). *On-line Teaching and Learning in Higher Education: A Case Study*. The University of Southern Queensland. Retrieved July 27, 2009 from http://www.dest.gov.au/sectors/higher_education/publications_resources/other_publications/on-line_teaching_and_learning_in_higher_education.htm

Ramsden, P. (1992). *Learning to Teach in Higher Education*, Abingdon: Routledge and Falmer

Reigeluth, C. (1999). What is Instructional-Design Theory and How is it Changing? In Reigeluth, C. Ed. (1999) *Instructional-Design Theories and Models: A New Paradigm of Instructional Theory Volume 2*. New Jersey: Lawrence Erlbaum Associates.

Rowntree, D. (2002). Preparing Materials for Open, Distance and Flexible Learning. Abingdon: Routledge Farmer.

Salmon, G. (2001). *E-Moderating: The Key to Teaching and Learning Online.* Kogan Page: london

Salmon, G. (2006). *Etivities: The Key to Online Learning,* Abingdon: Routledge Farmer.

Sharples, M. (2006). Socio-Cognitive Engineering. In Ghaoui, C. (2006) *Encyclopedia of Human Computer Interaction*. Hershey, PA: Information Science Reference

Sloep, P. et al. (2004). Basic Design Procedures for E-Learning Courses. In Koper, R. & Tattersall, C. (Eds.) *Learning Design: a handbook on modelling and delivering networked education and training*. Berlin: Springer.

Sodhi, T,, Miao, Y., Brouns, F., Koper, R. (2007). *Bottom-up and Top-down: An alternate classification of LD authoring approaches*. Paper presented at the TENCompetence Open Workshop on Current research on IMS Learning Design and Lifelong Competence Development Infrastructures. June, 21-22, 2007, Barcelona, Spain. Retrieved July 27, 2009 from http://dspace.ou.nl/handle/1820/978?mode=full

Stubbs, T., & . Gibbons, S. (2008). Design drawing outside of ID. In Botturi, L., & T. Stubbs T. (Eds.), *Handbook of Visual Languages for Instructional Design: Theories and Practices*. Hershey, PA: Information Science Reference.

Trayner, T., (2002). *Practical Approaches to Electronic Engineering – an SFEU funded teaching intervention*. Falkirk: Falkirk College of Further and Higher Education. Retrieved July 27, 2009 from http://www.sfeu.ac.uk/projects/falkirk_intervention_1

Twigg C. (2005*). Keynote Summary: Improving Learning and Reducing Costs - New Models for On-line Learning*. Paper presented at the ALT-C 2005 conference, Manchester Retrieved July 27, 2009 from http://www.alt.ac.uk/altc2005/keynotes.html#carol

Wenger, E. (1998). Communities of Practice. Cambridge: Cambridge University Press,

Williams, R. (1994). *The Non-Designer's Design Book: Design and Typographic Principles for the Visual Novice.* Pearson Education.