Designing for Change: visual design tools to support process change in education

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1 Abstract
This chapter looks at the possible uses of visual forms of Instructional Design (ID) languages as possible ‘change agents’ for design practice in the public post-secondary education sector. A lot of work is being done in the technical realm of the standardisation and interoperability for Educational Modelling Languages (EMLs), but this is largely restricted to existing ID specialists that use ‘dialects’ of ID languages and schemes. This is important work but it does not address the vast majority of educators working in the post-secondary public educational sector whose design work is highly individualised and deeply embedded in rich institutional contexts. The challenge for visual ID languages and EMLs in general is how they can move beyond their current specialist niche applications to be useful to mainstream educators. In this chapter we argue that this development needs to happen along 2 related dimensions: (i) changes in the organisation of the educational workplace and related training – what might be termed ‘push factors’; and, (ii) the use of tools such as visual ID languages to support that change process at individual and group levels – what might be termed ‘pull’ factors. We shall be concentrating on this second dimension. Specifically, in this chapter we shall be looking at ideas for how we might apply visual ID languages as a support mechanism in helping educators externalise and share their design models and ideas in order to develop them into semi-formal abstractions that might be developed to feed into the use of EMLs. To ground these ideas, we shall be looking at the experiences of those who have tried these types of approaches in practice. Finally we discuss the effect this type of perspective might have on the future development of visual ID languages and related tools.

A Note on Terminology:
We use Pedagogy interchangeably with Teaching and when we use the term Pedagogic Design it equates to Instructional Design.

2 Overview
An important characteristic of this chapter is that, as a starting point, we do not regard teachers as fully formed instructional designers, we think it is better to regard them as novice learners in this field and explore how we might help them by the use of visual ID tools. We provide our rationale for this approach in section 3. The IMS Learning Design best Practice Guide and much of the current work in the area has, by necessity, tended to assume that the teachers can produce a formal narrative of their design that can then be converted into the various abstract representations the language and tools provide. Our experiences suggest that in the mainstream the journey from individualised and isolated design activities, that characterises the majority of current practice, to a semi-formal expression that can be shared and elaborated upon is the first crucial step that we need to concentrate our activities upon. The need to direct support to this ‘preparatory’ stage of design was recognised during the discussions of the European Commission funded UNFOLD project that brought teachers and IMS Learning Design developers together (Griffiths & Blat, 2005).

Figure 1, below, illustrates the relationship between current practice and possible sources of information that can be utilised to produce semi-formal expressions of instructional design that can act as a ‘halfway house’ to a fully formalised narrative.
Fig. 1 Moving from current ‘embedded’ design practice towards more formal expressions

Thus the visual design languages and tools we are concerned with in this chapter are predominantly in the top left quadrant of the Use classification scheme diagram devised by Botturi et al. (2006) for visual design languages, see figure 2. Namely, we are concerned with reflective communication and creative generation of designs for individuals and groups. But, as will become clearer as we progress it may well be possible to use such languages for communication of ‘final’ designs—depending what the community of users see as a ‘final’ design.

This consideration of the purpose of use of visual design languages also leads to a central theme that we develop in this chapter—to enable the process of change in an academic community. An important point that we argue here is that in respect to instructional design activity in academia (i.e. creation, articulation and sharing) there is currently no effective design community. For us it is vitally important to provide a means of communication to describe this design activity. As Botturi, Derntl, Boot, and Figl. (2006, pp 1217) put it:

“The combination of design language and notation system is a central concept in the definition of a design team or community, as a shared language is the medium for the creation of shared culture. From a practical point of view, a language is fundamental for a community to share their practices and to engage in reflective thinking.”

Once the academics start to communicate ideas about design only then does it become possible to change practice.

Fig. 2 Usage Classification of Visual ID Languages, Botturi, Derntl, Boot, and Figl (2006)
But much of the discourse to date in this field has been aimed at the ID community and has tended to project their organisational and conceptual models onto the mainstream. As in many other areas of e-learning these types of assumption are way-off from the reality. Greller (2005) brings us down to earth with a bump when he informs us that there are hardly any ID professionals in the mainstream, and that therefore the ‘understandability’ of languages is crucial. This is why we are taking the approach we mentioned above in this chapter.

In section 4 we briefly describe the current state of play as regards to existing work on IMS Learning Design and tooling to support design creation and instantiation. We also summarise some relevant existing approaches to visual ID languages and tools.

To ground our discussions in realistic contexts, in sections 5, 6 and 7 we report on the experiences of 3 different projects that have sought to enable the sharing of instructional designs in a number of different ways using visual language approaches. We feel that the results of these case studies give weight to our earlier observations and conclusions about current design practice and provide some useful guidance for future development.

Finally in section 8 we bring together our discussions and experiences to develop a set of suggestions and guidelines for future development in this area that include a generic architecture for a visual design environment that might be capable of supporting individual and group activities.

2.1 Taking a Systems Perspective

As Carol Twigg (2005) has observed, e-learning has tended to remain as a ‘bolt-on’ to existing institutional structures and processes and is therefore unable to realise its full potential. Many researchers and practitioners are coming to the conclusion that the real challenge to successfully implementing e-learning is in changing the structures and cultures of our institutions so that they can effectively use e-learning and flexible learning (Collis & Moonen, 2004; van der Klink & Jochems, 2004). This entails taking a systematic approach to the problem of incorporating technology usefully into our educational institutions, such an approach is relatively new in mainstream education but by necessity has long been the norm in specialised open learning and vocational training providers. In an influential book entitled Integrated E-Learning: implications for pedagogy, technology and organisation, (Jochems, van Merriënboer, and Koper, 2004) the authors make the case for regarding the introduction of e-learning as not merely an addition to the existing system of instruction but as something that requires a fundamental redesign of the educational system. They envisage that this redesign has to address the pedagogical, organisational and technological aspects in order to solve the educational problem of providing high quality education, to a greater number of students from more diverse backgrounds, in more flexible ways with limited resources. To help in this task of redesigning the educational system (at, say, an institutional level) the authors advocate the deliberate use of use of e-learning tools as a catalyst for changes to the system:

“in order to bridge the gap between the different disciplines, tools and concepts should be available that can serve as mediators on the
conceptual level in analysis and design, as well as actual implementation. So-called learning technologies play a critical role in this bridging function. They can be considered as a means of formalising pedagogical and organisational thinking in such a way that it can be implemented in a technical solution.” (Jochems, van Merriënboer, and Koper, 2004, pp7)

It is exactly this wider role for VIDL and tools that we envisage in this chapter – as a means of supporting change in pedagogic design practice in the mainstream.

3 Why Process Change?

3.1 Drivers for Change

Generally, across the industrialised and developing world, the demand for post-secondary education is rising and public sector educational providers are expected to deal with larger number of students, from more diverse backgrounds, in more flexible ways, with little extra increase in resources. Even campus-based students are beginning to be treated in some respects as distance learners (Ask & Haugen, 1995). In this situation, ever-greater expectations are being placed on the use of technology to support teaching at university level and in the vocational and community sectors, implicitly, to increase the efficiency of the process. To this end, large amounts of money are being spent by governments to improve the IT infrastructure and student facilities in these institutions.

The lifelong learning agenda is another driver for greater access to education and training as the needs of workers and citizens in the modern ‘knowledge economy’ require more flexible, timely and personalised support. The link between education provision and economic prosperity is being increasingly recognised by governments and policy developers, the EU Lisbon agenda being a classic example. It is also recognised that the existing educational system has to change to meet these new challenges. The European Open and Distance Learning Liaison Committee nicely summarise the situation as follows:

“The Lisbon Agenda has been adapted in 2005 to act as an updated focus for European policy development. The adapted agenda calls for a strong and fundamental effort to equip the European citizens at all levels with the right knowledge, skills, and attitudes, and society at large with a full understanding why this is needed. The present education and training systems are not completely equipped to face this challenge through conventional learning methods. A substantial amount of learning innovation will be required for which the knowledge base is only fragmentary now.”


The specialist open and distance learning providers certainly do put a great deal of emphasis and value on their learning materials which are designed to carry part of the pedagogic load, the courses they support are also intensively designed. But most mainstream educational institutions do not have the design and pedagogic skills base
to engage in this market. Fernandez-Young et al (2006) described their experience of making learning objects for the UK eU (The UK e-University – which collapsed in 2004 with debts of £100million) as a very difficult exercise which they were only partly successful in, the notion of de-contextualisation and granularity being a wholly alien concept to them. Ultimately, they state that they were not convinced of the merits of the approach either. This is not surprising as the existing academic workforce simply do not have these types of instructional design skills. To clarify: academics don’t need or acquire these skills because they teach in a face-to-face mode; their teaching is literally ‘embedded’ in the bricks and mortar of the institution (Koper, 2003); to use a medical analogy they are the overworked ‘general practitioners’ of teaching—combining a host of other duties and responsibilities. In contrast the profession of instructional design for distance learning is relatively narrow, but deeper, and to continue the medical analogy they are more like consultant specialists.

3.1.1 Individual & Group Learning for Teachers

Individuals at different levels in an organisation find it difficult to conceive of the ‘bigger picture’ due to the local detail of their own situations and working cultures. To overcome this obstacle, modern systems theory seems to offer some help. It provides some useful analytical tools for identifying and understanding the dynamic relations between the factors we are discussing in this chapter. Senge and Sterman (1994) develop this theme in the context of Organisational Learning—a concept that is growing in interest, and it is worth briefly looking at some of their recommendations. They propose a 3-stage process for developing a better understanding of how an organisation actually works by the people within it:

1. Mapping mental models - explicating and structuring assumptions via systems models;
2. Challenging mental models - revealing inconsistencies in assumptions;
3. Improving mental models - continually extending and testing mental models.

They make the important point that flaws in the understanding of how an organisation works cannot be corrected until they are made explicit, which is the purpose of the modelling exercise. There is no reason to think that such an exercise could not be applied to higher education. The 3-stage process of mapping, challenging and improving mental models proposed by Senge and Sterman (1994) seems equally applicable to the task of improving the individual instructional design skills of teachers.

The particular staff learning need we are interested in here is instructional design for e-learning. The heart of the problem is that teaching staff generally do not share and reuse learning resources and learning activities, 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 and therefore difficult to share and abstract. In this pedagogic environment lecturers feel most at ease developing content and delivering it to their students. Conceptualising learning activities for their students is not a particularly common activity (Koper, 2003), and
sharing these conceptions with colleagues is even rarer. As Allison Littlejohn (2003) 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.”

A seminar of the JISC (Joint Information Services Committee)X4L programme in January 2004 building on earlier discussions in the e-learning community suggested that what was needed were a number of initiatives and support tools to help teachers bridge the gap between traditional embedded pedagogy and the more abstract representations required by IMS Learning Design (Beetham, 2004). One of the conclusions of the X4L seminar was: “That many teachers do not possess a vocabulary for articulating and sharing their pedagogic strategies and designs with others, particularly beyond their cognate discipline areas.” (p. 11).

Technologies such as VLEs, learning objects and learning design all strongly imply working as a team to design, develop and deliver courses—the importance of this should not be underestimated. Working as a team, sharing learning resources and discussing approaches to teaching are currently comparatively rare in Higher Education in the UK.

The most important building block in our proposals for the development of academics is for them to work in teams that do not just include academics but also media designers, learning technologists, and educational design specialists such as instructional designers. This division of labour is necessary for efficiency (Laurillard, 1994) but from our point of view this is where the real usefulness of technologies such as learning objects and IMS Learning Designs becomes clear. They become what Wenger calls ‘boundary objects’. Chapter 1.3 describes a similar role for the use of design drawings by architects and others that support communication between different stakeholders and gradually moves towards more formal representations. This simple idea has some important ramifications about the uses of these technologies:

1. They act as a form of collective memory for a particular community that can be accessed and reused by that community in the future
2. They support the construction of, and sharing of enough meaning between different groups (subject academics, tutors, administrators, instructional designers, media designers, etc.) to allow them to understand their place in the educational system they are working in.

Working as a team to design, develop and deliver courses, sharing their learning materials and conceptions about the teaching and learning are the basis for potentially powerful staff and institutional development processes. The ability of learning objects and IMS Learning Designs to support this process can be exploited. Properly conceived and planned this process may also play a role in building and strengthening scholarly communities. Hernandez-Leo et al. (2005; see also Chapter 3.4) recommend this approach to support the design of online collaborative learning activities pointing out that this is a requirement of Participatory Design (PD) approaches (Muller & Kuhn, 1993) to the design of social systems.
4 Existing work on IMS Learning Design and uses of VIDL

Currently there is a lot of research work going on that aims to support teachers to articulate their designs and activities in ways that can then be further developed into formal IMS Learning Designs. All this work is valuable, but we need to also recognize the rougher and more tentative conceptions of pedagogy that practitioners really use: we would call these ‘primitives’ and ‘artefacts,’ terms introduced by John Casey into the UNFOLD ([http://www.unfold-project.net:8085/UNFOLD](http://www.unfold-project.net:8085/UNFOLD)) project discussions (Griffiths & Blat, 2005). These in turn can become the building blocks of more elaborated and structured representations that are still ‘fuzzy’, that lie midway between actual embedded practice and the formalized narrative required to initiate a IMS Learning Design. The IMS Learning Design Best Practice Guide describes the starting point of creating a design as an analysis phase that results in a structured narrative. As Griffiths & Blat (2005) point out no structure or methodology is recommended in the IMS Best Practice Guide to support this activity.

This leads us to suggest the useful notion of a ‘learning design continuum’ as shown below:

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

Figure 3. A Proposed IMS Learning Design Continuum

In this chapter we are particularly interested in the ability of visual instructional design languages to support the process of individuals and groups being able to move their design practice to a midway position on this continuum—to produce a semi-formal narrative.

Some tools are highly specialised and powerful instantiations of existing ID models such as the MOT+LD (Chapter 2.3; de la Teja et al, 2005). This is aimed at existing instructional designer specialists who are able to work within the ‘doctrine’ and vocabulary of the accompanying ID model. Although an admirable piece of work, the tool interface and vocabulary and concepts are still far too complex and abstract for mainstream teachers—which to be fair it is surely not aimed at. Naturally, many developers think the solution is to get the interface right; the ASK-LDT tool from the University of Piraeus and of course the LAMS tool from Australia are both good moves in this direction, but the price they pay is a decrease in power and expressiveness—in order to be easy to use the complexity has to be reduced, sometimes drastically. We think that the long-term reality though, is that the teachers and their workplaces will have to change in order take full advantage of EMLs etc. The whole basis for the use of EMLs, ID methods and Reusable Learning Objects is predicated on a division of labour approach (Friesen, 2004), which has not been discussed, to any great degree in the literature to date.

We think the stage before creating a formal learning design narrative is important to address and requires a combination of some staff development and training and some simple conceptual and methodological tools, intuitive design aids and ideally some
‘Just in Time Learning’ aids; all of which should be as low-tech as possible. The existing tools are moving in the right direction but there is much more to do to address where teachers are in reality, not where the developer community thinks they ought to be.

This is the area we think is currently neglected: understanding current design practice and context and exploring ways to move it from its current embedded, individual, isolated and non-transferable practice to a state where it may be abstracted and understood, in the first instance by the author as an aid to self-reflection (Botturi et al, 2006) and then shared by others. In this we think simple approaches that are informed by mainstream reality will be most effective. At the moment the IMS Learning Design specification and its attendant communities are useful insofar as they clearly identify the far end of a learning design continuum. Having said that, we think this is valuable as it provides a fixed point of reference to relate our discussion to at our end of the continuum. The diagram below would illustrate our overall view of the continuum.

![Diagram of the learning design continuum](image)

**Fig. 4** The learning design continuum
5 Case Study – University of Stirling, Scotland

5.1 Background: Choosing an ID Framework

The Learning to Learn project (L2L) received funding under the JISC Exchange for Learning programme (X4L) for the period September 2002 to July 2005. The aim of the project was to focus on learner activity and pedagogic outcomes related to the sharing of learning-objects and learning designs. The subjects of the study were learning-support tutors in post-secondary education. The L2L project adopted an ID design framework provided by Tom Shuell (1992) a prominent educational psychologist that placed teachers conceptions about the learner’s cognitive activity at the centre of the design process. The Shuell ID framework was intended to be used as means of helping them express their pedagogic designs for a particular learning-object in a structured and shareable way that could then be incorporated as part of the metadata associated with each learning-object.

In summary the Shuell ID framework argues that for any learning episode to be effective a set of twelve ‘learning functions’ must be activated: it is essentially a taxonomy of cognitive learning activities. It is based, as all taxonomies are, on a set of ontological agreements or statements (tacit or formal) about the meaning of each taxonomic element. In the Shuell framework it is believed that a learning function can be activated by any one of three agents, a learner, a resource or a teacher.

A list of the twelve functions is provided below for reference in Table 1

<table>
<thead>
<tr>
<th>Shuell's Learning Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define Learning Expectations</td>
</tr>
<tr>
<td>Encoding</td>
</tr>
<tr>
<td>Feedback</td>
</tr>
<tr>
<td>Motivation</td>
</tr>
<tr>
<td>Comparison</td>
</tr>
<tr>
<td>Monitoring</td>
</tr>
<tr>
<td>Prior Knowledge Activation</td>
</tr>
<tr>
<td>Hypothesis Generation</td>
</tr>
<tr>
<td>Evaluation</td>
</tr>
<tr>
<td>Attention</td>
</tr>
<tr>
<td>Repetition</td>
</tr>
<tr>
<td>Combination, Integration, Synthesis (CIS)</td>
</tr>
</tbody>
</table>

Table 1 Shuell’s learning functions

The learning-support tutors’ explicit and structured pedagogic ideas were gathered by interview and form completion and then incorporated into the learning-object metadata and became known as the ‘Shuell analysis’ within the L2L project. An example of part of a Shuell analysis for one of the L2L Learning objects is provided below in Table 2. This particular learning object focused on the study skill of critical thinking and argument analysis.

The Shuell analysis was viewed as a possible way of enhancing the reusability (exchangeability) of learning-objects deposited in a repository as well as trying to provide a design framework for the original tutor and future users. Adopting the Shuell framework as part of the pedagogic design process was a significant part of the ongoing work of the project.
The resource uses a framework based on different categories of weak arguments as the main tool for learning.

The resource identifies the main elements of an argument – students must be able to synthesise these elements to be able to differentiate an argument from a non-argument.

Directs student attention towards weak arguments by using particular examples from the film 12 Angry Men.

The weak argument categories provide a way for students to think about different kinds of arguments and to classify them.

In assessing each video clip the student is encouraged to think about how the clip compares to an argument they have experienced directly themselves.

There are a number of video clips used, each clip must be analysed in a similar way.

Students are encouraged to reach a tentative conclusion about a video clip and then test this more rigorously through asynchronous discussion with their colleagues.

Table 2 Example of a Shuell analysis associated with a learning-object

**5.2 Expressing the Designs in Metadata**

In retrospect this was an ambitious objective. The difficulties of creating effective metadata are now well known. As Rehak and Mason (2003) state “[t]here is no ultimate or perfect metadata description of any LO [learning-object]. Each LO will have multiple overlapping partial descriptions, created by different communities depending on their needs or for different uses of the LO” (p.28). In addition, as Allert et al. (2002) state: “[The IEEE] LOM [Learning Object Metadata] does not support metadata about instructional models and instructional theory, even though authors are implicitly or explicitly using specific instructional theories, and LOM does not support information about the use of learning-objects in learning processes, which are a central concern in instructional design” (p.16).

On the whole the results from the evaluations reveal that expressing pedagogic ideas in this mode was both difficult and alien to the tutors involved and it offered little benefit as a means of sharing pedagogic ideas. Despite this, there was also evidence of greater self-reflection and the development of a shared language amongst the participant group, which we see as a positive indicator for using this kind of activity in the future to support process change.
5.3 Responding to the Designer’s Reactions

The reaction of the tutor-designers confirms the impression that they do not abstract, describe and share their pedagogic design on a routine basis nor do they have a common vocabulary for doing so. We needed to find a way to help the tutors engage with the Shuell framework that was more meaningful and relevant to them. After some discussion and experimentation we mapped the framework onto the very old, simple and intuitive teaching model that might be summarised as: ‘Prepare – Teach – Review’. We reproduce this mapping below in Table 3.

<table>
<thead>
<tr>
<th>Preparation Activities</th>
<th>Teaching /Knowledge Construction Activities</th>
<th>Review Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>Attention</td>
<td>Feedback</td>
</tr>
<tr>
<td>Defining Learning</td>
<td>Encoding</td>
<td>Monitoring</td>
</tr>
<tr>
<td>Expectations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior Knowledge</td>
<td>Comparison</td>
<td>Evaluation</td>
</tr>
<tr>
<td>Activation</td>
<td>Repetition</td>
<td>Feedback</td>
</tr>
<tr>
<td></td>
<td>Hypothesis Generation</td>
<td>Monitoring</td>
</tr>
<tr>
<td></td>
<td>Combination, integration, synthesis</td>
<td>Evaluation</td>
</tr>
</tbody>
</table>

Table 3 Shuell’s functions mapped to the Prepare – Teach – Review, Model

We also produced a graphical representation of this revised Shuell framework (shown below in Figure 5).
The visual mapping was useful as a visualisation tool for the project workers and, we felt, could be adapted into a design aid for group use and for media designers, but would still need the intervention of a specialist. At the time we speculated about creating simple interactive versions that could be used to link to text documents that could populate the ‘nodes’ of the framework. From this we also produced a revised form to help capture tutor-designers conceptions that seemed easier for them to use.

In evaluating the usefulness of trying to use the learning object metadata as a means of sharing pedagogic ideas, the replies received from the tutors involved in the project reflected the challenges involved. The completion of the metadata record (including the L2L Shuell analysis) is an example of trying to impose a method for creating a formal expression of a form of knowledge (practice knowledge), which may not easily translate to this particular formalism. As Kimble, et al. (2001) note, this kind of ‘soft-knowledge’ is difficult to articulate. The situation for the L2L tutors was particularly difficult because so much of what an effective learning-support tutor does relies on a sensitivity to the feelings and dispositions of their students, a kind of knowledge that can be very difficult to express in words let alone the formalism required by the L2L project.

Significantly, none of the completed tutor evaluation questionnaires mentioned the Shuell analysis stored in the metadata as part of their process of deciding whether or not to download a learning object from the repository. It seems they ‘scanned’ the descriptive textual data in the metadata.

5.4 Conclusions: The Need for Authenticity

The empirical evidence within this research was elicited through three main processes: documentary analysis, an interview survey and participant observation in an attempt to achieve validity through methodological triangulation. The analysis of this evidence highlights the considerable challenges faced by teaching staff in attempting to develop and share learning objects and learning designs as part of their ongoing teaching practice. However, the analysis also provides some insight into the possibility of using the exchange as a means of knowledge sharing supporting professional development and collaboration.

In conclusion, we emphasise the need to pay significant attention to the (contextually specific) social practices within which the use of learning objects and learning designs are enmeshed. By explicating the details of such practices (rather than adopting a narrow, technical focus on the attributes of the learning objects themselves) it is envisaged that the efficacy of using these resources may be improved.

The key problem that must be overcome is to make tools and methods available to the users that they can relate to, contextualise and find relevant and useful. A way we have sought to describe how such an approach may be successful is that the vocabulary, the tools and methods etc must be ‘authentic’ to the teachers working realities. Such an authentic approach must, however, be subject to a certain creative tension between helping to articulate current practice and changing it—often quite radically. We shall return to this theme in the final section of this chapter to illuminate possible visual design support mechanisms for the future.
6 Case Study - University of Klagenfurt, Austria

6.1 Background: cultural change towards e-pedagogy

At present, the majority of learning experiences relating to online course elements or blended learning courses restrict themselves to “digital bookshelves,” i.e., lecture notes for download, pushing copy and printing costs from the institution onto students. The pedagogic value of such use of learning technology is highly limited and thus prevents further take-up or demand for learning technology by both staff and students. This usage pattern does not do justice to the ability and potential of available learning technology and creates a widening gap between non-educational uses of information technology (e.g. online socialising, online transactions, self management, etc) and e-learning.

The vision at Klagenfurt University therefore is to enhance pedagogic use of learning technologies and the institutional learning management system, particularly a shift from the mere consumption of static content towards online activity. Lecturers are expected to conceptually take the step from “what do I provide” to “how should my students use what I provide”. The philosophy of working towards this goal is to instigate a change in mindset—that the provision of university teaching is a changing and developing profession.

Two projects have been initiated to provide a jumping off board for these developments on an institutional level: (a) a production guide to online learning, a kind of didactic toolbox; and, (b) a collection of best practice teaching strategy designs.

6.2 Educational Reality and Cultural Change

Our case study has followed these two projects and reveals a shift in our focus to a concentration on supplying a more holistic design environment that can support the work of academic staff. This approach takes into account the reality of the authoring environment and skills of tutors. We found that practically all machine-readable design languages, such as IMS-LD or EML are at the abstract remote end of the continuum of learning design expressions. The use of visual design languages for modelling educational activities is still a rather complex and specialist skill that is beyond the reach of most members of staff, but we think has the longer-term potential to bringing it closer to home. This resembles other layered linguistic approaches such as the Creative Commons (http://creativecommons.org/) legal licensing model which consists of three comparable usage levels: 1: human readable code, 2: lawyer (expert) readable code; and 3: machine readable code.

Observational evidence suggested that lecturing staff are faced with two main subconscious challenges when confronted with the implementation of e-learning design into their teaching practice: (1) The unreflected and deeply embedded routine activities of their teaching; and, (2) the transfer of current offline practice into virtual space—the latter being a consequence of the former.

While issue 2 may be seen as the first and quite important step for newcomers to cross the e-learning threshold, issue 1 strongly indicates that at grass-root level teaching
“design just happens,” i.e., is often ad-hoc and instantaneously developing via classroom dynamics. It is generally our aim to move beyond this type of design as well as away from solely content-based delivery towards more advanced forms of interaction and collaboration

6.3 Educational Workspace

Virtual Learning Environments (VLEs) have done a great deal in helping staff take the first steps toward online learning and teaching. However, although these platforms are usually well equipped with various tools that can be used to support online and collaborative learning effectively, e.g., wikis, discussion boards, chat, etc. These tools can also be ignored or misused.

As mentioned above, tutors often cannot see beyond their routine and context, and there are perhaps too few drivers to stimulate reflection. In our opinion, therefore, many members of staff need support in taking the next step and visualising new opportunities, reviewing their methodology, overcoming fears and generally getting creative in their teaching. This is where in our opinion visual modelling approaches could be a useful tool for professional development of lecturing staff.

6.4 Project Motivation – sharing designs

Despite the many advantages of VLEs, among which we want to mention explicitly the security and privacy of the individual learning space, this also is a disadvantage when it comes to sharing and learning from others. During extensive talks with staff at our institution, it emerged that what would be needed is viewing and learning from other people’s practice in order to get inspired in one’s own delivery.

A look at various courses brought to light the most common methodologies in use. Apart from the common use as digital bookshelf for downloads, the other striking feature was the pedagogic absence of what might be called “connected tools.” There was evidence that lecturers tried to use most of the tools available through the VLE platform, but in many cases the uses did not share a common learning objective, and instead were sitting side-by-side, without semantic and/or pedagogic connection—evidence of a fragmented approach and awareness.

The proposition was that in order to help staff meaningfully connect tools together in teaching strategies or units of learning (UoLs), visual languages might play a positive role in illustrating the connections between the activities and eventually perhaps even allow entire course maps to be transferred between users and disciplines. We think these more abstract ID visualisations would need to have the ability of attaching a description of the tools and resources used to achieve the outcomes, basically an annotation system. Of course, the means of connection should also follow expression of current pedagogic thinking as well as good delivery and support practice.

6.5 Pedagogic Strategies and Notational Challenges

The above aspects of online delivery and demand for inspirational strategies prompted us to initiate a project to address these issues. We were looking for an integrated and pedagogically sound way of capturing, describing, modelling, and presenting back delivery strategies with the aim of being able to analyse, store and share them among
members of staff. To achieve this we started a project to create a best practice collection of teaching strategy patterns.

The project is experimenting with the practical implications of capturing and describing learning sequences. These will not be full course modules, but rather pattern style sequences or pedagogic primitives and artefacts. The aim is to sift through existing practice and handpick a representative selection of more complex designs that are deemed good educational practice and potentially transferable.

The main phase looks at the following aspects:
1. Capturing: visualisation of IMS-LDs
2. Categorising
3. Describing/Evaluating

In the first phase, that has been completed recently, we aimed to define the conceptual framework conditions of capturing and visualising instructional designs and patterns. This was followed with selected courses being modelled as a pilot.

While the purpose of the project was reasonably clear, the way forward was not. Questions that raised their heads immediately were:

- What represents pedagogic and didactic quality?
- Which instructional design language should we use?
- How can we articulate what happens in class?
- What is an appropriate level of abstraction and complexity?
- What pedagogic model(s) are used?

6.5.1 Quality
The first issue was whether we would aim to capture and model what represents quality in delivery. However, it proved rather impossible to decide what pedagogic quality in this context actually means or even whether it bears any significance in ID notations (Wenning et al., 2006, 8ff.). Even if marked as pedagogically sound, a captured educational pattern could still be misused by applying it to the wrong context. We therefore decided to provide user-centred freedom of interpretation and trial and error opportunities instead of prefabricated quality approval. This was generally supported by the fact that ID languages are quality neutral and do not capture quality notations, but rather confine themselves to illustrating sequences of events (see Botturi, Derntl, Boot, and Figl, 2006). We did, however, envisage inter-subjective feedback and the use of recommender technology to be integrated later on a meta-level, much in the way that personal ratings are used in shopping portals such as e-bay or for shared learning designs in the LAMS Community (http://www.lamscommunity.org/lamscentral/).
6.5.2 Language

The choice of ID language was dominated by the available products and the competency to use them. Among the plethora of VIDLs and emerging tools, a web-based in-house product called EduWeaver was used for modelling the pilot. This application has its own visual notation system not connected to the available IMS specs and more oriented towards RLOs (Reusable Learning Objects), which proved rather useful since most courses are content heavy. It does provide the option of exporting to IMS Content Packages but in its present version it lacks roles. Despite being teacher-centred, for simple object sequencing it was an interesting experience to model course activities with it and allowed parallel pathways in the delivery structure.

One question regarding the usefulness of educational design tools is: “Who’s talking?” EduWeaver being teacher-centred allowed only modelling the teacher activities. Thus it is used as a personal planning tool. An alternative approach that we applied simultaneously was to introduce student-centred design approaches via the 8LEM (Verpoorten, Poumay & Leclercq, 2005) model from LabSET at the University of Liege. 8LEM (= 8 Learning Events Model) is a user-friendly way of identifying types of learner engagement. 8Lem provides a series of learner/teacher events or interactions; we used the learner side of the model to complement our use of EduWeaver.

For categorisation purposes we again follow the 8LEM model, as we believe that through its accessible and easily intelligible semantics it provides a perfect learner-centred design-aid as well as a browsing and searching framework. This is based on the heuristic assumption that lecturers (should) ask themselves: “what do I want my students to do?” Thus, this can provide a low threshold entry to searching for inspiration for one’s teaching methodology. Categorising IMS-LD primitives and artefacts has to emphasise the main criteria of any pattern in question— in this case student activities.

Another challenge was to articulate the intentions connected to a particular teaching sequence and modelling the process. Interviews with the designers/authors showed the deficiency in common vocabulary to express what was otherwise a well thought out educational pattern. The actual modelling work proved a useful tool for reflective
analysis of the chosen delivery strategy. However, the presentation varied widely from lecturer to lecturer as some went more into detail than others or used different expression methods. This is in line with the experiences of the OUNL in Holland (Janssen & Hermans, 2005, p.255).

6.6 Conclusions: The Linguistics of Design

Beyond the specific ID modelling agents, it was an interesting finding of the project that the teaching delivery tool (VLE) mixed with ‘human code’ determined the shared vocabulary. A comparable analogy among motorists would be the code in use by truck drivers being different to that of formula 1 drivers. Though they both perform closely related activities, the technology determines the vocabulary. This led to the conclusion that while there may be a limited number of baseline notations such as IMS-LD XML structures, there are an infinite number of possible user-facing modelling agents, ranging from the very simple to the very complex and detailed. The challenge is to find the right ‘human code,’ vocabularies and concepts that teaching staff can relate to, allowing human interactions with designs, both in creating and communicating.

Thus the VLE itself, although not a specific instructional design platform, provides a common vocabulary and iconography for people to share activities. Not only is the design articulated to students in that it tells them what steps to take within the VLE, and how to interact, it also is a useful communication base for academic users of a particular system, and sometimes between systems. Thus, the sharing of designs and strategies can reduce itself to a tools-based approach for a particular learning goal, e.g., MCQ test construction.

When taking a bird’s-eye-view on the workflow patterns of lecturers, it emerged that many of the current instructional design tools would be something that sits outside the habitual usage patterns of day-to-day online and offline tuition. Highly abstract in notation, requiring alternative vocabulary, taxonomies, and training for translating it into a design map. Thus their likelihood of adoption is likely to resemble that of artificial languages such as Esperanto or the earlier Volapük, which despite being created as a deliberately simple-to-use code, never really came to more than a manifestation in a particular academic community. This differs from the lingua franca evidence where a real language (usually of strong economic impact) despite all its disadvantages becomes a de-facto standard for a region or a community.

Translating this perspective into the world of learning design leaves us with a desire to take a closer look at what is already in use, such as ‘VLE-talk’, ‘human code’ and popular tools such concept maps, mind maps and other ad-hoc representations to find ways and methods to visualise those expressions. As Stubbs and Gibbons (Chapter 1.3) point out the role of rough design sketches is an established part of many design professions but rather underdeveloped in the field of Instructional Design. Current design languages sit at the far end of the spectrum between real and abstract, between actual and wishful, between expressive and rigid. Our perspective would provide a way to identify the mid-way point we are aiming to reach for our semi-formal expressions and which lecturers are able to generate and share.
7 Case Study – University of Ulster, Northern Ireland

7.1 Background – developing a reference model to capture and share learning designs

The University of Ulster hosts the “Centre For The Utilisation Of Institutional E-Learning Services To Enhance The Learning Experience”. It is part of a network of centres across the UK, sponsored by the national organisation responsible for developing and promoting teaching in the Higher Education sector—the Higher Education Academy.

The aim of the Centre is to “promote, facilitate and reward the adoption of a learner centred reflective practice approach to the development of teaching and learning, in particular with respect to the use of e-learning technologies.” A key aim of the Centre is to seek to develop a reference model for excellent and effective practice that could be used to promote and evaluate practice. The strategy of the Centre is to extend and develop existing teaching practice and e-learning rubrics in order to capture them and codify them to provide a simple reference framework for practitioners.

But the challenges of describing and disseminating effective practice was soon recognised to be a more critical factor in the promotion and facilitation of changes in academic practice. With this in mind, the Centre focussed on the potential use of learning design models to establish an effective means of describing and disseminating good practice in the development of online learning activities in an easily understandable manner.

The need to describe and disseminate effective practice has become increasingly important and there are many emerging trends and technologies to capture, record and disseminate current practice.

Existing approaches to describe teaching and learning activities tend to focus on the practical acts and supporting resources rather than the processes and tend to lack a detailed ‘human context.’ There are many pedagogic and instructional models and theories that can describe activities in some detail but they suffer from a doctrinaire approach, which while useful and necessary in specific educational work contexts—such as open learning and vocational training—suffer from considerable semantic and syntactic restrictions when applied to the mainstream. The Stirling case study in this chapter would be a classic example of this phenomenon.

7.2 Requirements

The specific requirements of this initiative are to establish, pilot and disseminate findings on a simple and consistent recording procedure to capture current teaching and learning processes and practices. The main aim of the procedure is to demonstrate how all activities can be mapped onto a series of widely understandable set of teaching and learning events, where the tutors’ and students’ activities and roles are clearly defined at each stage. The strength of the method proposed below is its transparency, use of plain English and its potential for breaking down complex learning activities into a generic, re-usable format so that good practice can be disseminated, reused and evaluated easily. The method has added value in that it
promotes self and peer reflection of teaching and learning practices and communicates teaching and learning practices to in a way that can support evaluation.

7.3 Approach – adopting the 8LEM Model

The introduction of the IMS Learning Design specification has given great encouragement to those who would like to share their learning design practices to provide a meaningful dissemination of practice, especially as this opens the way to sharing learning designs and their respective models with the potential to be re-used by others. Inspired by this development the aim of our current project is to better describe the overall process of teaching and learning in a more effective and shareable manner. The need for a “learner focus” required any modelling approach to have a dual perspective (learner and tutor) to best capture the distinct activities of the two stakeholders and their interactions.

The project examined several emerging approaches in development and identified the 8 Learning Events Model (8LEM) developed by LabSET of the University of Liège, Belgium, as a viable foundation for this work. This model focuses on processes in teaching and learning rather than on actual content being taught, so had the potential to be mapped to IMS Learning Design. It proposes a ‘palette’ of 8 specific ways (learning events) of learning/teaching that the teacher or learning designer can use to describe any point in the development and analysis of learning activities, as shown below in Fig. 7

The model does not specify a particular order to these learning events; it simply provides a choice of learning/teaching processes, which can be used in mapping or creating learning scenarios. The model connects the interdependent learner’s demand and the teacher’s supply, providing a social interaction perspective to each learning activity and event. The advantage of this model is that it allows learning activities to
be mapped onto a series of widely understandable set of learning events so that the tutors and students experiences and roles can be clearly defined at each stage. It results in a simple, easy to understand method of describing key activities in plain English – a key requirement.

The eight main learning events are:
1. **Receives** (Traditional didactic transmission of information: lecture/ content delivery/recommended reading)

2. **Debates** (learning through social interactions, collaborative, challenging discussions e.g. f2f debates, online discussions)

3. **Experiments** (Learner manipulating the environment to test personal hypotheses e.g. lab work, workshops, computer simulations, problem solving)

4. **Creates** (Creating something new, producing work e.g. essays, projects etc)

5. **Explores** (Personal exploration by learner e.g. literature reviews, Internet searches, information handling)

6. **Practices** (Application of theory and its assessment, to include tutor feedback- e.g. Exam, quiz, exercises, work based learning etc)

7. **Imitates** (Learning from observation and imitation e.g.: where the tutor models techniques, modeling/simulation, practicals, walk through tutorials, role plays)

8. **Meta-learns** (self reflection at the end of a learning process)

### 7.4 Adding more Detail to the 8LEM Model

This initiative aimed to further explore these learning events in terms of the student and tutor activities in more detail. To achieve this, a decision was made to employ a simple reflection tool to allow users to develop this area. The outputs of the Learning Designs project at the University of Wollongong (see Chapter 3.3) produced a list of 30 or so generic verbs that provide a common sense set of terms to describe teaching and learning that teachers are comfortable with, these were kindly supplied by Sue Bennett through the final meeting of the EU UNFOLD project in Berlin, 2005. These 30 verbs were chosen to extend each 8LEM event to clearly define potential tutor and student “activities”. These succeed in providing a further simple yet powerful aid to describing practice by allocating appropriate verbs to each role within each individual 8LEM event, the verbs are shown in table 4 below.
Table 4 – Learning Activity Verbs from the University of Wollongong

<table>
<thead>
<tr>
<th>University of Wollongong Learning Activity Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
</tr>
<tr>
<td>Analyse</td>
</tr>
<tr>
<td>Apply</td>
</tr>
<tr>
<td>Assess</td>
</tr>
<tr>
<td>Construct/Produce/Create</td>
</tr>
<tr>
<td>Critique</td>
</tr>
<tr>
<td>Debate</td>
</tr>
<tr>
<td>Decide</td>
</tr>
<tr>
<td>Describe</td>
</tr>
<tr>
<td>Design</td>
</tr>
</tbody>
</table>

A prototype process was established to trial the model with academic practitioners, this involves a face-to-face meeting with a structured introduction and is facilitated using simple flash cards that help to record detailed information for each learning activity in the 8LEM model. A process and sequence of structured questions are used as prompts. To provide an initial reference point for the modelling, users were asked to provide a lesson plan/outline of the activity to be described. This helped the interviewers to be more prepared and more aware of the context of the learning activity and provided a useful reference resource during the modelling process.

7.5 Overview of the developed hybrid teaching and learning model

1. Basic structure is the 8LEM model: Provides a high level breakdown of the practice in question with distinct teacher and learner perspectives

2. Addition of the Wollongong Learning Verbs: Provides a Detailed description of interactions and activities for each role within each 8LEM event. To provide additional support for the modeller, relevant subsets of the 30 learning verbs are suggested for each role in an 8LEM learning event, these lists provides teachers with a supportive framework to best describe their own and their learners’ activities.

To facilitate the modelling process, a series of simple two-sided flash cards were produced, each representing an 8LEM event on one side and the 8LEM event with relevant teacher / learner verbs on the other. A number of visual aids were incorporated into these flash cards to provide re-enforcement of the 8LEM interaction type and the distinct learner and teacher roles. One of the visual cues utilised was a random pair of background facial images to stress the distinct teacher and learner roles. Users introduced to these cards stressed strong (and often differing) views on the types of faces used to represent learners and teachers. This feedback clearly demonstrated the effectiveness of these additional visual cues but also that they could act as a distractor as well as a re-enforcer. A second set of flash cards using more heavily watermarked images of androgynous faces were tested with the initial sample group and found not to induce any negative feedback.
To date, the project team have used a facilitation approach carried out in an informal setting such as a coffee bar. Following a brief overview to the modelling process and the 8LEM events, staff were provided with a set of flash cards. Using a lesson plan as a reference point, the teacher was encouraged to select appropriate 8LEM event cards and place them on the table. Once an overall sequence of events have been described, the member of staff is then encouraged to turn over the flash cards one by one and to pick the verbs that most closely describe their own activities with the 8LEM event and also that of their learners. In cases where more than one verb per role are selected, the member of staff is encouraged to consider if these activities form an asynchronous sequence within the event or an overall synchronous interaction, providing a useful granular interaction sequence within an 8LEM learning event.

At the end of this process, the facilitator transcribes the model onto a template form for review and reflection, see an example below in Table 5.

Fig. 8 Front and Back of the 8LEM + Verbs Flash Cards
25

The following notes accompany this completed form:

"**Theme**: Communication and experiential learning and element of assessment.

Students receive case studies of 2 conditions per week over 8 weeks in a web enhanced module with an exam based on these at the end of the semester, they are expected to explore and discuss these with members of their group and then feed-back on the case study to the entire group."

After analysing the learning activity the academic concerned is considering changes and may consider doing the practice bit and assessing throughout, perhaps including a rubric to mark contribution to the discussions and feedback to the entire group, rather than an assessment at the end of the course.

The academic found the process very useful in breaking down this learning activity and thinks that it would be useful to apply at the design stage of learning activities.

### 7.7 Conclusions- Results of the pilot modelling activities

A pilot group of staff from the University of Ulster worked with CETL staff to describe a practice from their own teaching experience. These staff were selected from a range of academic disciplines and provided a diverse group in terms of age and gender. Each staff member successfully created a model of their practice that they felt accurately described their own activities and the interactions they believed they had.

<table>
<thead>
<tr>
<th>Tutorobjectives</th>
<th>TutorRole</th>
<th>Learning Event</th>
<th>Student Role</th>
<th>Student Objective</th>
<th>Environment</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students are presented with a case study (via VLE)</td>
<td>Describes</td>
<td>RECEIVES</td>
<td>Question</td>
<td>Review</td>
<td>Interpret</td>
<td>VLE</td>
</tr>
<tr>
<td></td>
<td>Presents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instruct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students are split into groups and are asked to discuss and analyse the case study for 1 week</td>
<td>Critique</td>
<td>EXPLORES</td>
<td>Analyse</td>
<td>Interpret</td>
<td>Describe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluate</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>React</td>
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<tr>
<td></td>
<td>Respond</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each individual group discuss their case study and report their findings back to whole group</td>
<td>Review</td>
<td>DEBATES</td>
<td>Present</td>
<td>Describe</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Summarise</td>
<td></td>
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<tr>
<td></td>
<td>Observe</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Evaluate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exam on case studies</td>
<td>Assess</td>
<td>PRACTICES</td>
<td>Produce/Create</td>
<td>Interpret</td>
<td>Reflect</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluate</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Reinforce</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Table 5 Ulster Template form for review and reflection completed

The following table notes accompany this completed form:

<table>
<thead>
<tr>
<th>Tutorobjectives</th>
<th>TutorRole</th>
<th>Learning Event</th>
<th>Student Role</th>
<th>Student Objective</th>
<th>Environment</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore</td>
<td>META-LEARN Ongoing throughout linked with experiential learning</td>
<td>Reflect (on practice)</td>
<td>Self reflect, self assessment, hypothesis, experiential learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td></td>
<td>Hypothesise</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summarise</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
with their learners. All found the selection of 8LEM activities to break the modelled practice into a sequence of distinct interactions simple and informative.

Staff reported that they found the use of the narrative verbs to be very helpful, with some indicating that achieving precision in the choice of the correct verb forced them to reflect on their actual experiences rather than their intentions. The informal nature of the flash cards promoted experimentation with the sequencing and description of the learning process, indicating ongoing questioning and reflection by the participant.

At the end of the initial pilot phase, the CETL team believe that this hybrid model is simple to use and can provide significant insight into the human aspects of teaching and learning activities in a clear and widely understandable way.

Potential benefits:
1. Powerful tool for recording practice and processes in learning activities
2. Provides a rich reflective opportunity for practitioners to review their learning activities and their design and their interrelations with students
3. Widely understood, plain-English terminology
4. Could be used to help design and refine lesson plans and learning outcomes.
5. Could form the basis for a conversational evaluation of practice through the comparison of learner and teacher perspective models
6. Provides simple check lists and complementary teaching/learning plans to assist in the adoption of the modelled practice
7. Provides the basis for a learning design transcription ‘nexus’ between face-to-face and online and vice versa.

7.7.1 Possible extension of the hybrid model to encompass formal IMS Learning Design schemas
In order to provide a fuller context to the activity and to permit re-usable frameworks of the activity to be generated for use in VLE’s and other learning management-like systems, the potential to add additional context information to construct a formal (IMS based) IMS-LD narrative of the activity has been investigated. This can achieved by revisiting the developed 8LEM / Verb model and appending the following data to each of the 8LEM events for both the tutor and learner perspectives:
- Objectives (outcomes) for each LEM / interaction;
- Resources used (if any) in support of this activity
- Environment (tools, locations etc.) used to facilitate the activity / resource access

7.7.2 Prospects for automation
The project team feel that it is very important that this analysis starts with face-to-face interaction, precisely because these academics work in such an isolated way. Automation would increase rather than decrease this isolation, if building a community is the priority—to enable meaningful communication and the developing of skills—then face-to-face is the way to go. As one trainer/facilitator said: "you need to see the whites of their eyes!" However once a certain level of understanding and trust is built up it might be possible to automate this process to a degree by providing online forms and templates to fill in. However the best technical support mechanism may just be a simple access to a shared collection of learning designs using this
rubric. Arranging face-to-face meetings at the start and end of a semester to develop and check designs is a highly beneficial activity that would be likely to be needed to support any ‘automation’ functions.

8 A Prospectus for Future Development of Visual ID Environments

8.1 Analysis and Requirements

8.1.1 Analysis
Given the observations, arguments and case studies we have developed so far we think that, for our purposes, it makes much more sense to think in terms of what kind of support environments teachers might need to articulate and share their semi-formal designs. The discipline of ergonomics (the study of work) has much to say about how we should go about creating such work-support environments (Singleton, 1989).

In e-learning, teaching & learning is dependent on technology—although this says nothing about what drives what. As the technology develops, more complex services are applied. However, no simple technology disappeared from this step-stone environment (see the illustration). Higher levels simply use more components. In the context of visual languages, a useful analogy may be the linguistic relationships of speech: no words without sounds, no sentences without words, no paragraph without sentences, no speech without paragraphs, and no speech without sounds, without words, without sentences! One leading to the other to transport more and more meaning. Our ideas for a support environment are informed by this linguistic analogy, where communication may be supported at both the ‘primitive’ and formal end of the learning design continuum, and move between.

Educational design has always existed. It may be implicit, vague and based on self-directed learning by lecturers operating largely outside formal educational theory and disciplines. But the accuracy of expression required by the technology, where one symbol e.g. “<” in the wrong place can cause a catastrophic break-down, is a powerful force for change from an implicit environment to an analytic explicit environment. This dialectic between the implicit and formal in e-learning is still in the process of resolution, this chapter, indeed, many chapters in this book, being examples.
We should remind ourselves of the target users of such environments and their organisational contexts. Most HE teachers are pedagogically untrained and have rather modest Information Technology (IT) skills (word processing, email and web browsing being the IT skill set). This provides a realistic baseline. To this we can add our earlier comments about the sharing of learning materials and designs being unusual (other than very small scale), the lack of a common pedagogic vocabulary and no widespread tradition of team teaching and ownership of courses. Organisationally, it would be fair to say these teachers are just as concerned with issues of administration, quality control and assessment, as with pedagogy, and any environment that could alleviate these burdens would have considerable interest. The possibility of using such data to aid design activities in order to reduce the bureaucratic quality inspection duties and keep courses inline with their original design and marketing details would be useful.

8.2 Requirements

8.2.1 Instructional Design Activities

In the light of the analysis and the rest of the chapter we might sum up our primary requirement as: communication before everything. In other words the main priority is to assist the teachers to use the environment for the following types of activity. The key words are in italics and are taken a classification of uses suggested by Botturi, Dernhl, Boot, and Figl. (2006)

- Create and *Generate* their designs by exploring the design ‘space’, refine designs and examine alternatives;
- *Reflective* communication with themselves about their designs—useful in the first conceptual stages before they collaborate with others;
- *Communicative* activities with others about the design for groupwork and may involve different views; and,
- The development of *Finalist* version to ‘freeze’ a final version for sharing and elaboration into a more formal version.
We have adapted that usage classification diagram to apply to our domain. These activities place our initial projected activities for teachers and their colleagues in the top left hand of Botturi, Derntl, Boot, and Figl. (2006)suggested classification scheme for the possible applications of visual design languages (see figure 9; adapted form Botturi et al., 2006). As Botturi, Derntl, Boot, and Figl. (2006). point out, these classifications can cover a range as indicated in the figure. In our context as the artefacts and primitives are generated and reflected upon they then move towards becoming incorporated into a semi-formal expression of design. This means the environment needs to be able to also support a move to the bottom right hand quadrant of the diagram. There may be a number of semi-formal designs required to represent a course or unit of learning.

8.2.2 Data Management Support
The needs of this community are both simple and difficult:
- Individuals will need their own personal space and be able to easily annotate their designs.
- Groups will also need a similar space to share their designs and add annotations about their work.
- Finally, a ‘formal’ institutional space where designs can be ‘signed-off’ and stored long-term will be needed.
- The ability to access student management information in different ways would be very useful for course design and evaluation. For example, to be able to project student exit points and numbers, reasons and assessment results, etc., on a curriculum map could be a useful diagnostic tool for redesign.
- Similarly the ability to access course description information easily and map on to visual designs would be useful to help courses ‘drifting’ away from the original marketing descriptions given to students (a problem in the UK).

8.2.3 Outline Architecture for an Instructional Design Support Environment
In many ways, so far, this description is very similar to the Xerox Parc IDE (Instructional Design Environment) support system of the late 1980’s which was a repository of hypertext documents that could be linked as the designers saw fit, to support customised workflows and different design models (Goodyear, 1997). The IDE model included ‘decision’ design cards and ‘rationale’ links with the decisions being made according to a set of design components. We can see a similarity to the Ulster case study here. The IDE software provides the means to supply a repository of designs and components that can be annotated for future users—especially useful for trainee designers and knowledge capture exercises. The other attractive aspect of IDE is that it is not linked to any ID model and is intended to support an iterative ‘spiral’ style development model, which would be very attractive to our target audience.
Again, there are clear parallels here with the comments Stubbs & Gibbons (Chapter 1.3) make about the role of design drawings in the wider design field.

To be clear, we are not proposing to use IDE, but we would like these kinds of services. What we see is a system that would allow people to customise it at different levels for different design styles and workflows, this would provide for ‘localisation’. Something like a modern digital repository system like Fedora and the associated annotation and groupware tools like Project Pad would provide a powerful infrastructure, but so too would Microsoft Sharepoint (the latest version of which incorporates blogs and wikis), and even a system composed of a simple database, word templates and a shared directory would be good enough used with email. The point here is not to get hung up on the technical aspects to what is primarily a human and organisational problem.

9 Conclusions

We have introduced the idea that teachers in the post-secondary public education sector are novice instructional designers and are likely to find creating formal design narratives difficult. We make the case for aiming to create semi-formal design statements by teachers as an intermediary point before continuing to create more formalised and abstracted narrative that can be converted into an EML, if required. We have argued that this problem is best solved by adopting a systems approach. We go on to describe some of the drivers for change and the difficulties teachers experience in the instructional design field when using technology and the potential benefits of adopting semi-formal methods that incorporate visual approaches. We briefly look at existing work in the learning design field and provide a useful ‘learning design continuum’ to help the reader situate our discussion within. Following this, to illustrate our points, we provide 3 different case studies of efforts to capture and share instructional designs that included visual components. These three (independent) case studies show an interesting progression:

1. From a specialist ID framework and vocabulary that was difficult to use by the teachers (the Stirling Study).
2. Through to a more teacher-centred approach using an authoring tool to capture teaching activities and the 8LEM model to capture the student side of the interactions (Klagenfurt Study).
3. Finally ending with combination of the 8LEM model (used to capture both teacher and student activities), to which was added the Wollongong verbs to provide a good level of granular descriptive detail in an acceptable manner (Ulster Study).

The Ulster approach looks very promising and we can see clear precursors to this in the other two studies—despite their happening independently. Ulster is also fortunate in having greater resources to devote to this and it is notable that they have decided on a strongly human-facilitated approach.

We have then continued to discuss the likely characteristics of future design support environments and made suggestions for their future development in the light of our discussions and case studies.
Finally, we think we have made the case for taking informal and semi-formal approaches to instructional design seriously. There are serious limitations in the current approaches to creating instructional designs advocated by the communities involved with educational and cognitive theory, and the IT developer communities. We have situated this discussion in the context of wider changes in the academic community including staff development, changing roles and institutional reorganisation.

10 References


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Merriënboer, Bastiaens, & Hoogveld (2004) Instructional design for integrated e-learning


