Getting From Here to There: using learning objects and learning design to articulate pedagogic strategies in higher education

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Abstract

This paper examines the potential for using learning objects and learning design as vehicles for discovering, sharing and developing pedagogic strategies and designs based on the experience of the JISC funded L2L project- part of the X4L programme. We argue that the introduction of these technologies into higher education reveal and highlight underlying obstacles to their adoption in the form of existing pedagogic practice and values. We argue that the process of creating learning objects and learning designs not only provides valuable opportunities for staff development but also makes it almost inevitable.

Introduction

Learning Objects, Learning Design and their associated technologies are entering the mainstream of the educational systems around the world and creating a 'buzz' of excitement about the possibilities of providing an efficient means of finding, sharing and reusing learning resources. Yet, as is so often the case with the introduction of technology into an educational setting, this is also bringing some underlying issues and features in our educational institutions to the surface (Neil & Cornford, 2000). We argue that this reification effect of technology in education far from being a problem can be a useful development aid and shall concentrate on its use as a staff development tool for improving pedagogic practice. This paper reflects emerging findings of the Learning to Learn (L2L) Project, a research and development project in the UK – for more information about the L2L project see below.

The particular staff development need we are interested in is educational design for e-learning. The nub of the problem here is that teaching staff have little or no training in designing learning activities for their students and instead concentrate on preparing content to deliver to their students (Koper 2003). The teaching practice that is carried out is deeply embedded in an institutional context and therefore difficult to share and abstract.

The rapid development and emergence of learning object technologies together with publicly funded programmes to adopt them have served to highlight these aspects of the higher and further education sector in the UK. But the status and importance attached to teaching is at a low level (Ramsden, 1991). Newly inducted academics are still told their professional priorities are research, administration and teaching – in that order. Yet the rapid and un-funded expansion of higher education into a mass system is placing increasing burdens on the traditional 'cottage industry' approaches to teaching that depended on teachers and students both being drawn from relatively homogenous social and academic backgrounds.

This shortage of pedagogic skills in the UK higher education sector is constantly being highlighted by technological innovation and this is increasingly being acknowledged by the main funding bodies and their development programmes such as the JISC (Joint Information Services Committee) Pedagogies for e-learning programme and the HEFCE (Higher Education Funding Council for England Fund) for the development of teaching. Paralleling this there is emerging evidence that strategies to encourage reuse and sharing of teaching and learning materials can have a marked positive effect on student performance (Boyle, 2003 & Trayner, 2002).

So, the arrival of learning objects, learning design and their related technologies from the industrial training and open learning sectors present challenges and opportunities, the problem for us is that the higher educational sector does not have the highly focused and coherent organisational structures that these technologies require. Instead higher education is

characterised by a very high degree of informality and autonomy at all levels – which is not necessarily a bad thing. An excellent analysis of these systemic obstacles to using technology in higher education has been carried out for the ERSC by Newcastle University (Pollock & Cornford, 2000). The study found that the basic business processes often simply do not exist; a web version of the report can be found in the ARIADNE newsletter at:

http://www.ariadne.ac.uk/issue24/virtual-universities/

Thus learning objects, learning design and their implicit organisational and pedagogic models are colliding with the deeply entrenched pedagogic values and attitudes of the higher educational sector. This collision resembles those between the tectonic plates of the earth's crust with earthquakes and volcanic eruptions marking the interface. Anyone who has worked in this area will recognise that it is a volatile environment that is still in the process of forming as the recent demise of the UK e-University has shown (MacLeod, D. 2004). In this process orthodoxies from both sides are being challenged in the new and emerging teaching practices and learning communities appearing at this interface. From our work so far in the L2L project this interface looks like being a useful one to explore and develop pedagogical practice because of the reification effect of learning objects.

Capturing pedagogic strategies – the L2L project

The Learning to Learn Project is a 3 year project looking into the practicalities of finding, re-purposing and sharing learning resources in learning object format between study skills tutors in different organisations. The project is part of the Exchange for Learning (X4L) Programme that is tasked with exploring the technical and pedagogical aspects of implementing and using learning object technologies in the UK tertiary education sector. The X4L Programme is funded by the Joint Information Services Committee – the UK body responsible for supporting the use of ICT (Information and Communication Technology) in this educational sector.

One of the key activities of the project is to try to introduce and use a common vocabulary to describe pedagogic strategies in the use of learning resources by an existing community of practice - study skill tutors. We wanted to find a way to describe the actions of the tutors in terms of the effects that they were intended to have on the students. This was often in the context of a single class session with a simple resource such as a paper handout - so this might be described as pedagogy at a micro level. There are a multitude of models and theories of learning and instructional design from which we could choose. For our project we chose a model developed by Shuell (1992) one of the attractions of his work is that he advocates building a descriptive cognitive bridge between instructional design and constructivism. Shuell argues that every successful learning episode involves certain 'learning functions' and that a learning function may be activated by the teacher, the learner or by a resource acting as an instructional agent.

Initial results show that this is a potentially useful support and communication tool for the tutors to share their pedagogic practice and designs – although a great deal depends on how the vocabulary is introduced to start with. But the main lesson we have learnt is that the terminology of such educational and cognitive constructs often make little immediate sense to practitioners, although with good mediation it can, over time, develop into a nexus between teachers and designers and provide a useful shorthand. The main conclusion we drew from this experience is that it is better to work outwards from teachers existing conceptions and terminologies towards new concepts and terms, rather than to expect them to adopt new frameworks. This is how we think the introduction of learning design will progress and as we shall see there are already indications emerging that this is the case. In the final form (see

below) we redrafted Shuell's functions to map onto the old (and still very widespread) 3-step model of teaching described as:
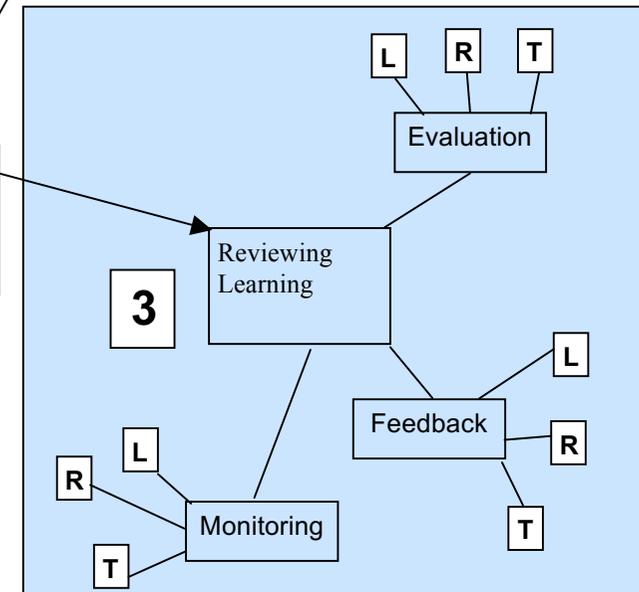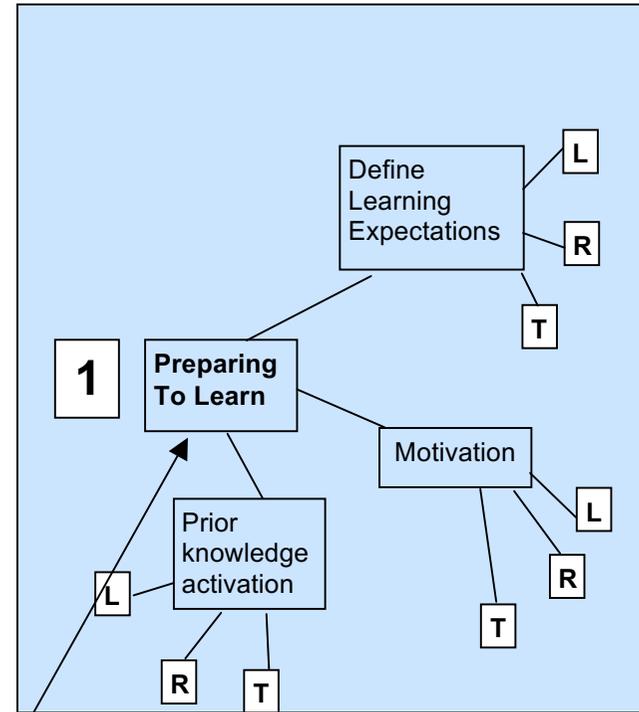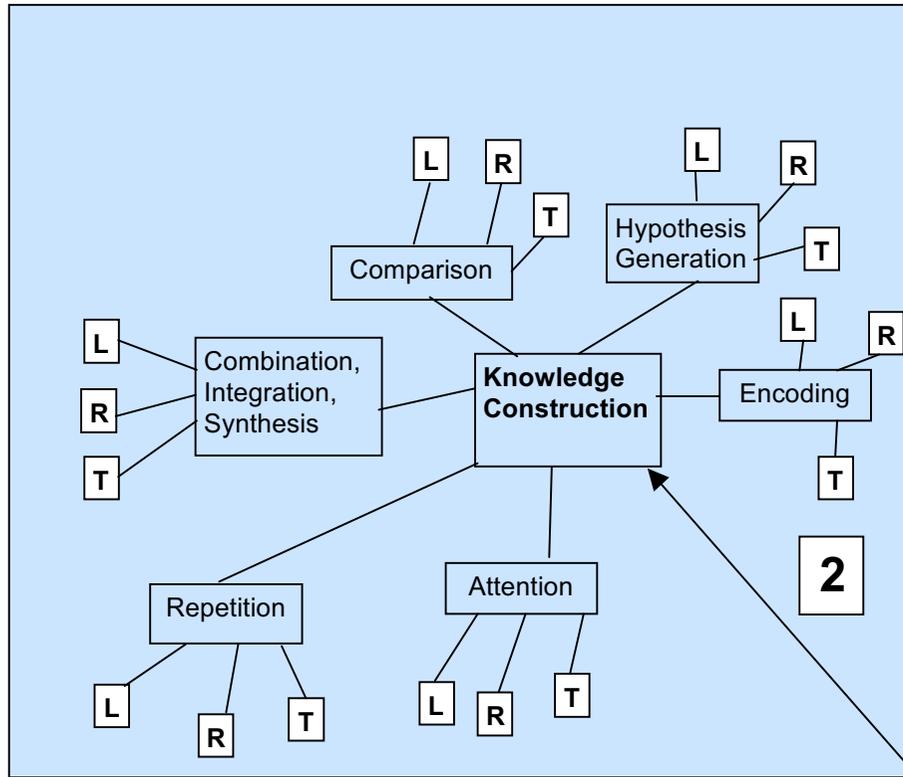
Prepare

Teach

Review

Please see the tables below.

A byproduct of this approach is that it also looks like having the potential to providing a useful shared pedagogic analysis and design tool for use between educational designers and media designers, which we intend to develop further. Diagram 1 below shows this graphical representation (this first appeared in the Learning Technology Newsletter of the IEEE Computer Society in, Vol. 6, Issue 3, July 2004)

1. Preparing to Learn Functions	Provided by Tutor or Resource	Provided by Learner
Define Learning Expectations	Provide Overview (map, diagram); Statement of purpose.	Identify purpose for using program
Prior knowledge activation	Remind learner of pre-requisite information.	Ask self what is already known about the topic
Motivation	Give opportunities for interaction; interesting material	Personal interests; look for ways to make it personally relevant. Make it a game.

2. Learning Activities Functions	Provided by Tutor or Resource	Provided by Learner
Combination, Integration, Synthesis	Provide ways to combine and integrate information; - e.g. with graphics or multimedia.	Establish categories; construct tables; seek higher-order relationships.
Attention	Highlights, animation, audio supplements.	Identify key features. Record notes.
Encoding	Provide diagrams and/or multiple examples/contexts; Suggest mnemonics.	Generate mnemonics images and/or multiple examples/contexts.
Comparison	Encourage comparison with diagrams, charts, questions.	Look for similarities; Draw diagrams, charts.
Repetition	Guided practice and/or reflection. Multiple perspectives/examples.	Systematic reviews.
Hypothesis Generation	Encourage student to think of and try various alternative courses of action.	Generate possible alternatives and corresponding solutions.

3. Reviewing Learning Functions	Provided by Tutor or Resource	Provided by Learner
Feedback	Provide instructionally relevant feedback and correctives.	Seek answers to self-posed questions.
Evaluation	Have next action by student based on student's evaluation of feedback received.	Ask, "What do I currently know?" "What do I need to know?"
Monitoring	Check for understanding.	Monitor performance. Self-testing.

Box 1:

Define Learning Expectations — L, R, T

1 Preparing To Learn

Motivation — L, R, T

Prior knowledge activation — L, R, T

Box 2:

Comparison — L, R, T

Hypothesis Generation — L, R, T

Combination, Integration, Synthesis — L, R, T

Knowledge Construction

Encoding — L, R, T

2

Repetition — L, R, T

Attention — L, R, T

Box 3:

Evaluation — L, R, T

3 Reviewing Learning

Feedback — L, R, T

Monitoring — R, L, T

Learning Episode

L — Learner

R — Resource

T — Teacher

Graphical Representation of Shuell's Model

E-learning as a disruptive and subversive technology for pedagogy

As noted in the introduction technology in higher education often acts as a strong force that can force to the that surface hitherto hidden factors and demystify existing processes, this section looks at some of these kinds of issues.

Universities in the UK tend to be quite traditional in the way they organise their teaching activities. Lectures still tend to be the main focus of undergraduate teaching despite their being little educational justification for their existence other than being a medieval solution to the logistics of delivering information to large groups of students (Laurillard, 1994). A thought provoking critique of lectures entitled "Twenty terrible reasons for lecturing" by Gibbs (Gibbs, 1981) is available at the OCSDL website (see the references), reminds us that the tenacity of traditional approaches to teaching in higher education should not be underestimated.

In higher education teaching (outside distance learning providers) there is little tradition of recording and sharing pedagogic strategies and to try to do so is often met with confusion and hostility. One of the major reasons for this is that teaching in higher education is essentially delivered by groups of individuals who see themselves primarily as subject specialists and not teachers. This situation is compounded by the fact that many institutions are loosely organised and also do not see teaching as a core function either (despite considerable financial evidence otherwise).

A number of researchers have observed that the transmission model of teaching is widespread (Shuell, 1992. Laurillard, 1994. Koper, 2003. Ramsden,1991.); it is based on a deficit – accrual notion of learning that sees the main task of the teacher to supply information. This pedagogic model might have worked when students and teachers were from similar social and academic backgrounds in traditional university settings. However this system is failing under the sheer weight of extra students and the diversity of their social and academic backgrounds.

From the students perspective dealing with academic teachers and institutions is often one of dealing with individual academics all teaching on the same course but from different scripts who can barely acknowledge that they are part of a department, and the departments themselves often behave as if they are not part of the wider university. To say the least this can be confusing for students – even 'traditional' ones. A picture that emerges is that of a student passing through the hands of individual academics all using their own notes and with little coordination with each other - this is entirely consistent with the 'subject specialist' model of amateur teaching.

In this pedagogic world view we can see why some teachers like to stick with creating and transmitting content, because they created their own content as part of the process of their own learning, and relearning, of their subject in order to teach – or transmit it to their students. Thus their teaching strategy is often to get their students to learn from what they did – this is not a very sound approach, but it is common and intuitive and helps account for lecturers deep attachment to their own 'stuff'.

Moving from this pedagogic model can be a scary journey for many lecturers and we need to be able to support them in the stages of their development. As one contributor to a mailing list observed "we are dealing with an essentially untrained workforce". Both Postle (2004) and Goodyear, (2001) observe the pressing need to move from the pedagogy of the individual teacher to that of a team.

So what do we do with HE teachers? In this situation lecturers need support from some source (such as colleagues or support staff) in beginning to articulate their teaching strategies. This is an important first step, because until they start to talk about what they do they cannot share their conceptions. To facilitate this we need to recognise the rougher more tentative conceptions of pedagogy that practitioners really use and reflects the real situation of lecturers – we would call these 'primitives' and 'artefacts'. These in turn can become the building blocks of more elaborated and structured representations that lie midway between actual practice and the formalized language of Learning Design.

A Proposed Learning Design Continuum

Artefacts……………….Semi-Structured……………………Formal

Tools and methods are being proposed to take care of the these 'middle' representation such as mind maps, concept maps, the Semi-Structured Learning Design Statement from the ACETS, project at Edinburgh university (http://www.acets.ac.uk/) and the Dialog Plus (http://www.dialogplus.org/) design toolkit from Southampton university that can eventually lead to the development of more abstract formal expressions such as learning design

Giving lecturers the means and support to produce these very early conceptions of their practice is to our mind the key to the start of a powerful staff development process that would be mostly concerned with an approach that could best be described as cognitive apprenticeship This would aim to build teams and communities of practice amongst lecturers and support staff to provide the essential support they need to become 'independent learners about learning'. Although, as Goodyear (2001) observes:

> "…we should be very wary of the notion that we can 'create' communities. We should, perhaps, stick to the familiar territory of creating and managing organisational forms, in the confident hope that these will nurture the kinds of learning community which we value."

In other words, the way of achieving this will be to provide an environment in which such communities can prosper. The aim of this process would not be to force all lecturers into the same pedagogic model, but rather to give them the means to be able to articulate and share and reflect upon their pedagogic practice and to develop it as they want. Both Goodyear (2001) and Postle (2004) make that point that there is no single magic pedagogic formula that can be applied to e-learning design.

One of the problems (and benefits) of Learning Design is that to 'get there' we need to relate the context of a concrete instance of an educational activity represented by the design to a much wider set of concepts. In other words to produce learning designs we need to be able to stand back and articulate the pedagogic framework we are operating within and the organizational context that encapsulates both the framework and our activities and then produce an abstracted form. It worthwhile reproducing the diagram and text by Goodyear (2001) below to give an idea of how these entities relate
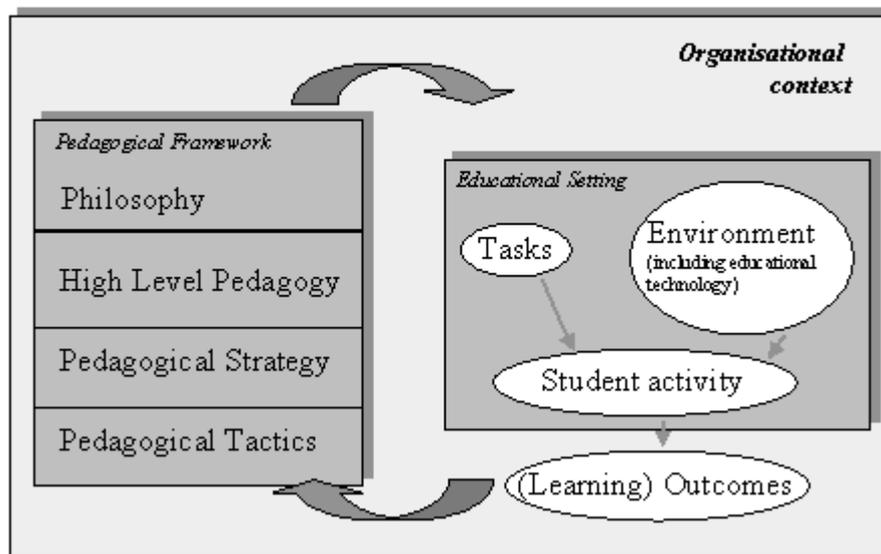
Diagram 2 (Goodyear 2001)

"This section sketches the anatomy of a pedagogical framework suitable for networked learning development projects. It also shows how the *idea* of a pedagogical framework relates to *concrete instances* of educational innovation and organisational context. Our goal is not so much to erect an ideal pedagogical framework. Rather, the point is to suggest the kind of *architecture* that such conceptual entities ought to have. This architecture has to reflect a balance between the needs of innovative practitioners and the complexities of the field within which we work. It has to speak to practice, but not trivialise what it represents.

[It] is an attempt to capture what we mean. The point is not to construct one ideal pedagogical framework. But neither are all possible frameworks equally satisfactory."

(Goodyear 2001)

Instructional Design – the ghost at the feast?

In the UK (as opposed to the USA) there is little in the way of an established tradition of instructional design (ID) either as an academic discipline or as a professional activity. If there was it would be a good candidate to help lecturers make the transition from individual 'place-based' teaching to more flexible team based approaches but there are currently few people around with these skills. What training that is available for lecturers does not really cover these areas. Here is a useful definition of Instructional Design from Goodyear (2001):

> "Instructional design (ID), may be defined as "a set of methods and tools which allow the efficient incorporation of the best of what we know about learning into the process of planning support for learning". ID can provide help in taking a principled approach to networked learning design because it

encourages the application of general principles to specific problems. Rather than seeing each design problem as unique, it is an approach to encourage the reuse of past solutions. It also encourages building good pedagogy into the design and development process e.g. by promoting close links between learning objectives and the design of learning activities."

(Goodyear, 2001)

We anticipate a growth of interest in ID in the UK – partly driven by need and also the emergence of the learning design specification from the IMS, which is highlighting the need for such skills (Beetham, 2004).

But is worth noting that in the UK there is a traditional antagonism to ID, partly because of a past association with behaviourism. Laurillard (1994) for instance describes it as:

"word games; it is not science"

For Laurillard there is no worth in such approaches (that speculate about internal cognitive process) and she sees no need for them in her conversational model of academic learning – which is a model well fitted to the task.

An important point to note here is that any attempt to articulate and share your pedagogic ideas and strategies necessarily involves making explicit how you think people learn – and how your teaching might help that occur. This is quite a jump for an 'untrained workforce' and, as already observed, a scary one at that! This makes the need for staff development and reflection almost unavoidable and ID, as described by Goodyear (2001), is a strong contender to help in that process.

Using learning objects and learning designs to discover, share and reuse pedagogic strategies and designs

The arrival of learning objects and learning design on the scene is having many unexpected effects. One of the traditional learning object orthodoxies is that they should be free from internal contextual content to make reuse easier, this makes a lot of sense for a specialist educational workforce as in computer based training and instructional design. But this presents severe problems for 'general practitioner' teachers and lecturers who are increasingly clear about their need for meaningful contextual information about the resource to enable them to assess it and reuse it, as witnessed at recent JISC X4L consultations in the UK.

A particularly popular request is for some kind of review process that allows users of the resource to record their usage and evaluation of it for others to examine (Rehak & Mason, 2003, Casey 2004). It is also increasingly being recognised that the production of this kind of usage information (sometimes called secondary metadata) can be important for professional and institutional strategic development purposes as Robyn, & Dalziel (2003) propose:

"These requirements make clear the need for new conceptions of learning object meta-data, and new ways of using repositories—not just for search and retrieval, but as a living, growing body of shared practice."

The IMS (Instructional Management Systems) learning design specification (http://www.imsglobal.org/learningdesign/index.cfm) offers some hope for recording and sharing pedagogic strategies but the learning design language itself looks far too abstract for general teaching staff to be able to use and is likely to be restricted at least initially to those

with the educational design skills that can work at that level of pedagogic abstraction. Yet the situation is not as negative as it might seem. A seminar of the JISC 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 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"

So far then, we have seen that teachers want and need contextual information to use learning objects and that learning design needs a level of abstract pedagogic expression that most teachers find alien. The image of two different pedagogic worlds colliding does indeed seem an apt one and has helped to inspire a conference in 2004 sponsored by JISC to explore these cultural differences (JISC, 2004).

Areas of Progress

We suggest progress will be in irregular steps as the two pedagogic traditions come to terms and begin to co-exist, there is some evidence for this already:

o The UK national repository JORUM that is part of the JISC X4L programme has decided to bow to user demand for a comments and review facility to be added to the search results interface – like the Amazon website.

o The JISC X4L programme seminar and the initial analysis of the JISC e-learning and Pedagogy programme have suggested that intermediate levels of expression are required that can bridge the gap between current pedagogic practice and the formal Learning Design language. A structured and common vocabulary is seen as the best hope for achieving this by JISC – clearly the two pedagogic traditions will have to cooperate to do this. In reality we see the need for a range of levels of abstraction of pedagogic strategy depending on the user. This suggestion has clear parallels with the programming practice of generating a structured and logical plain-english account of the solution to a problem on which to build the actual programme.

o Closely related to the previous point is the suggestion of creating e-learning design patterns that are reusable and adaptable (Bartolucci, S., et al. 2003). This is a simple idea but potentially very powerful and also capable of being used at different levels of abstraction. As the authors suggest the task of completing a pattern language to describe all of e-learning is a very large endeavour but that does not prevent us from using the concept right now. This article points to an experimental repository of educational design patterns at http://www.tisip.no/E-LEN/. An interesting aspect to the use of patterns is that it might also present an elegant solution to some of the dilemmas described by Stephen Downes (2003) between context and reuse. He raises some important points about the prevailing assumptions of the reusability of learning objects and learning designs. Educational design patterns might form the basis of what he describes as 'disposable designs' to be fabricated from the patterns into the Learning Design Language in a particular context. Thus, patterns might usefully correspond to what the community has called intermediate levels of description. In

this vision it would make sense for learning designs to be associated with their 'pattern' to help teachers adapt the Design. This could help reduce the cognitive load of deciding how and what to reuse by future users. This is certainly an area that would benefit from further research. This approach has striking parallels with the techniques employed by the Toshiba software factory where programmers were asked to file such 'high level' generalisations with their code (van Vliet, 1993).

o It is becoming increasingly clear that these kinds of activities require a team effort (Goodyear, 2001. Postle, 2003) and that this presents an ideal opportunity for communities of practice to develop and support lecturers (and institutions) to express, record and develop their pedagogic practice in new ways. These communities of practice have to work together to produce learning objects and designs. As such the learning objects and designs they produce embody the attributes of a 'boundary object' as described by Wenger (1998). This is potentially very useful as it provides a way for the different communities to communicate with each other and attach meanings to the objects and designs. This process can also produce a record of individual and group development, along the lines suggested by Robyn, & Dalziel (2003). This kind of approach has also been proposed by Friesen (2002) in the context of learning objects, metadata and meaning.

Conclusion

Learning Objects and Learning Design have been eagerly welcomed and adopted by the e-learning community in the UK and this has clearly brought to the surface some of the issues discussed in this paper. Rather than presenting an impassable obstacle this reification of existing pedagogic practice, attitudes and values is useful and identifies areas to be addressed through staff development, although we do not underestimate the task at hand. The opportunities and benefits of sharing learning resources and learning designs are generally accepted and great efforts are being been made to build a technical infrastructure to support these activities.

As a result of these developments it is now increasingly obvious that the human infrastructure needs to be developed to effectively use these new tools (and the more recent ones such as VLEs etc). This is likely to pose some significant challenges in the form of institutional and professional change. As Mayes (1995) reminds us

"education is a social and political system, and the checks and balances that keep the system working may not be shifted by any technology"

Along the way, we in may indeed find that learning objects and learning design do help in transforming teaching in higher education – it just might not happen the way we though it would. It may well be the case that the lasting benefit of learning objects and learning design is the change that occurs in the higher educational sector to accommodate these new tools.

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