

The impact of a Managed Learning Environment upon curriculum design

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Abstract The use of managed learning environments (MLEs) to support student learning is increasingly prevalent in higher education today. An in-house MLE, StudyNet, was introduced at the University of Hertfordshire in 2001. An institutional programme of support was introduced to encourage the widespread uptake of this MLE and this research investigates its subsequent use by teachers from a range of academic disciplines. Twenty three members of staff were interviewed about their approaches to teaching, their use of the MLE and their reasons for using it. The interviews were transcribed and the data have been subjected to an interpretive analysis. The research also draws on local policies and other documents that help contextualise the findings.

The results of this work-in-progress demonstrate that, despite the different challenges faced by different subject areas, the participants were committed to creating interactive and authentic learning environments. Small group work in particular, was predominantly interactive and student centred, whilst very large group numbers (circa 250 students) limited the potential for interaction. In addition to support module administration, the MLE was being used pedagogically in two distinct but related ways – extending the classroom and enhancing face-to-face activity. The latter category could itself be subdivided into 'doing different things' and 'doing things differently'.

Introduction and background

This article is part of work-in-progress and explores some of the ideas emerging from an ongoing case study.

Britain and Liber (1999) described Managed Learning Environments (MLEs) as 'learning management systems that synthesize the functionality of computer-mediated communications and online methods of delivering course materials'. Kaidan (2002) added student tracking capabilities to an MLE's potential functionality. The JISC differentiated between MLEs and Virtual Learning Environments (VLEs) – the VLE being a system that supports a range of on-line interactions between learners and tutors whilst an MLE is 'the range of information systems and processes that contribute to an educational establishment's provision of learning and learning management, including a VLE if the provider has one' (JISC 2000).

In 2001 the University of Hertfordshire (UH) introduced an institution-wide MLE, StudyNet, based on Lotus Notes (<http://www.lotusnotes.com/>). The system uses Management Information System (MIS) information to automatically create databases, or online learning environments, for all modules and populates them with the relevant students and staff.

The capacity of the MLE to automatically populate module databases is very important as it removes a significant workload from teachers and/or administrators to prepare the databases for use. From 2002/2003 there has been an ongoing strategic drive to increase use, develop Learning and Teaching expertise and develop StudyNet functionality. A range of measures have been put in place to enable StudyNet to become an integral part of the student and staff experience at UH. These measures included: an extensive staff development programme, coupled with a range of dissemination activities; a network of local support, organised by Faculty StudyNet Champions; the establishment of a StudyNet Learning and Teaching Project Group to promote the effective pedagogic use of StudyNet; and a programme of incremental usage targets.

StudyNet is now an integral part of academic and administrative life at UH. One crude measure of activity is the number of logins to the system and the following data illustrate the increasing level of use since its inception. The pilot year (2001/2) saw 588,000 staff and student logins. In 2002/3, when usage targets were introduced, logins nearly trebled to 1.51 million. The following year there were 3.46 million logins, with 80% of staff and students logging in. 2004/5 saw 4.62 million logins, involving 95% of staff and students. 2004/5 also saw more than half the logins originating from outside of UH for the first time. The upward trend continued in 2005/6 with logins topping 6.3 million – a mean of approximately 290 logins for each of the 22,000 registered users.

The StudyNet data also revealed markedly different levels of uptake by different Faculties, suggesting a different approach to its use by different academic disciplines. There has been a good deal of research into disciplinary differences and in 2002 Neumann *et al* published a review of teaching and learning in disciplines (Neumann *et al* 2002). They were particularly focussed on undergraduate provision and used a new framework for analysis. Using Biglan's (1973) 'hard/soft-pure/applied' categorisation, they explored: curriculum; assessment; cognitive purpose; characteristics of teachers; teaching methods; and requirements of students. Although it is not appropriate to go from generalisations to specific instances, a number of characteristics potentially separate the disciplines and may account for differences in approach to pedagogy and the use of an MLE to support learning and teaching. In particular, the 'hard' disciplines were more associated with linear, cumulative, quantitative knowledge structures with 'softer' disciplines associated with recursive and qualitative knowledge. Hard disciplines were more associated with lectures, laboratories and fieldwork,

whilst the softer subjects more associated with small group work, seminars and discussion. Carpenter and Tait (2001) reported finding transmission oriented 'traditional' practice in the sciences and student-centred 'progressive' orientation in the softer education faculty. They also found that academics used newer technology in ways that reinforced their approach to teaching.

This study was therefore undertaken in order to explore the impact of the MLE upon pedagogic practice in different subject areas. In order to contextualise the use of the MLE, it was important to explore the teacher's approach to teaching and the nature of the subject matter that they were teaching.

Method

The majority of participants were self-selected - an email was sent to all academic staff requesting volunteers. The primary inclusion criterion was that they actively used StudyNet to support their teaching (in practice they were a mix of innovators and early adopters). It became apparent that not all faculties were represented and two or three people from these under-represented faculties were identified and invited to participate. The intention was to recruit between 20 and 25 participants, which was determined by the resource available to the study and the belief that this would be sufficient to provide an appropriate range of views. In total, 23 academics from around the institution were interviewed about their subject area, their approach to teaching and their use of StudyNet. The interviews were recorded and transcribed. Once this had been done, a member check (Cohen *et al* 2003) was carried out in which a hard copy of the transcript was sent to the relevant participant so that he/she could verify its correctness. Participants were also given the opportunity to make additional observations or amend what they had said if they believed that it did not accurately reflect their views. The transcripts were then subjected to interpretive analysis in which each was read and re-read several times. As themes emerged, the transcripts were coded using Nvivo. The coding process itself was an iterative process in which the themes and sub-themes were refined, reframed and amalgamated.

Results

This section contains some of the main themes that emerged.

Themes related to Knowledge in the Disciplines

Theme 1 - All subjects had contested aspects

Neumann *et al's* (2002) review suggested that the hard subjects were more associated with objective, quantitative, 'right/wrong' knowledge than the soft subjects. This study elaborates on this in suggesting that all subjects appear to have some contested parts and some less contested aspects:

.....<engineering> is probably much more objective-based; making predictions based on a given range of facts that, basically, they and I are going to come with a congruent answer to. You can then open that out a little bit and test them with a few other questions to make it a little more subjective... (P4 - engineering)

However, the 'softer' subjects were likely to have a higher proportion of contested material.

... it is basic anatomy and physiology that is objective. It is the skills and the application of the skills and whether physiotherapy has an effect in the long term and all that side of things is relatively subjective (P1 - physiotherapy)

Theme 2 - Exposure to contention increases with academic level

Most participants recognised that as students progress through a programme the students were expected to deal with increasing amounts of contention and uncertainty.

In the first year Micro Economics you don't dramatically go into different schools of thought... <in> the second year they do different opinions.... (P21 - economics)

At undergraduate level we are teaching them what is on the <X-ray> image, how it looks like and it tends to be, forgive the pun, black and white. It is only at a postgraduate level we start actually picking that to bits and saying ... it is open to interpretation. (P5 - radiography)

Theme 3 - Students struggle with contention

A number of participants expressed the view that students struggle with uncertainty. For example:

Very often they don't believe you when you say 'This is an open question, I want to hear what you think about it' ...they are quite uncomfortable with the

thought that there isn't a correct answer that they can reproduce in an exam. (P23 - philosophy)

Perry's model of intellectual development may go some way to explaining the difficulties faced by learners and the process they work through to become more comfortable with the realities of an uncertain world.

Theme related to Learning and teaching in Face-to-face contexts

Theme 4 - Group size affects interaction

The teachers all used lectures and seminars and/or tutorials. In addition, 15 also used laboratories, workshops or practicals. Seminars and tutorials were terms used to describe a variety of approaches, but typically involved smaller groups than the lectures (7-40 students in the case of these participants). The increased interactivity associated with these sessions meant they were often used for content that was less clear cut than in lectures or as opportunities to use knowledge rather than just acquire it. For example:

The things we have tended to do in the tutorials are things that are perhaps less clear cut, ... and perhaps the students may need more help in interpretation of the information. (P13 - nursing)

<a tutorial> is much more about application than knowledge... (P17 - computer science)

Of all the teaching contexts described, lectures tended to be more teacher-centric. They typically involved some form of presentation by the lecturer and were more likely to have didactic elements. Nevertheless, most said that they tried to incorporate opportunities for interaction, either to check understanding or encourage students to think about or engage with content.

I throw lots of questions at them to get them to think about the application of <the subject>...so I try and keep it interactive... (P10 - business)

There are always points of discussion so it is not just standing up and spouting for two hours ...maybe splitting into small groups, buzz groups, for a bit of brief discussion to feed back to the main group and then a general conclusion at the end tying it together ... (P14 - nursing)

Class size did affect the amount of interaction achieved. The majority of teachers strove to create interactive environments with smaller groups, but with larger groups - around 150 - there was less agreement about how interactive it could be. For very large groups, teachers tended to agree that the capacity for meaningful interaction was limited:

My approach is to make <a lecture> as interactive as I can by my use of questioning, but when you have got vast numbers <ie 250> it is not always easy to manage that very well. (P21 - education)

Most of us try to develop some sort of interaction although it is very difficult with 240 students in the class (P19 - marketing)

With the exception, perhaps, of the lectures involving very large numbers, the variety and interaction inherent in many of the participants' lectures suggested that these were far removed from the stereotypical didactic learning experiences so often described. They were instead rich and engaging learning contexts and, although often more teacher-centred than some other sessions, they were still learner orientated.

In smaller groups interaction between teachers and students and student to student was much more prevalent. Various rationales for promoting teacher-student interaction were elicited. These included: guiding the students' actions and/or thinking; giving feedback in an adaptive manner; and gaining verbal or non-verbal feedback about their understanding.

...you have got opportunity to enquire with the students, 'Hey, what do you think is happening here? Do you trust the instruments?....' (P4 - engineering)

I think that is important that they are with you as you do that and I can explain if someone is looking puzzled, 'Do you understand?', 'Where are you lost?' etc. (P10 - business)

... it just takes one brave soul to say 'I don't understand what you have said' and that is fine, I tell them if you don't understand I would much prefer you to tell me then I can put it in a different way so that you do understand. (P16 - nursing)

Small groups were also a particularly good opportunity to welcome and value student contributions. These were recognised, in some instances, as being of greater value than those of the lecturer. This practice was overtly valuing the students and empowering them:

When they came into the <seminar> they had to come prepared with a small presentation of 5 to 10 minutes ... because we have a gathering of a whole lot of international students it is an ideal way of getting them to talk to each other ... <and> because they know their own country, the other students will get a lot of exposure into the other cultures etc. (P19 - marketing)

Themes related to the 'Pedagogic use of StudyNet'

As stated by Britain and Liber (1999), the key functions of MLEs are a means of communication and a way of delivering course materials. The notion of course materials could appear rather restrictive, but clearly the internet can be

a link to a range of external resources – both those suggested by a tutor and those found by the students' own research. The ways in which the teachers in this study used the MLE were classified in two ways – 'Extending the classroom' and 'Enhancing face-to-face interaction'. Although each theme can be described satisfactorily and have distinctive characteristics, they aren't mutually exclusive.

Theme 5 - Extending the classroom

The communication and resource provision capabilities described provided a means for supporting learning activities before a classroom session and afterwards. StudyNet was seen as a means for increasing 'contact' with students, perhaps most floridly expressed as follows:

I just don't like the idea of a student being in contact with me for four hours per week. ... essentially I am using <StudyNet> to drip feed the students during the week so they can't run away from <me>, giving them a nudge or a prod about the subject. (P4 - engineering)

The extension of the classroom is primarily longitudinal – the MLE enables learning activities to begin before a class begins and/or continue after it finishes. It enables the dialogue between teacher and students and students and students to continue. In fact, there were relatively few instances of the classroom being deliberately extended beforehand. The value of priming students for forthcoming sessions was, however, highlighted by a few teachers:

... when they come into the next session I know that they have been told what material they have to look up. (P19 - marketing)

...I put quite a lot of material in the news about tutorials, what we were going to do, what I expected (P16 - nursing)

There were several examples of capturing the content of the classroom so as to extend the classroom 'contact' after the session. For example:

... if they do stuff on flip charts then I might actually type that up and present it the week after. So StudyNet is useful for that in terms that you can type it up and put it up there. (P22 - nursing)

... I would go with some slides into the class and then based on what we have used and what we have discussed, I would improve the slides slightly and then post it and then they would have it as provision or a record of the lecture ... (P19 - marketing)

Theme 6 - Enhancing face-to-face interaction

As emerged in the general discussion of teaching, interaction was highly valued by teachers. At this early stage of implementation there were a couple

of specific examples of teachers using the technology to specifically enable them to enhance the F2F interaction. This was going beyond the notion of simply making the students better prepared for a classroom – as mentioned in the ‘extending the classroom’ theme – here the teachers were using technology to enable them to use the time in class differently. One teacher set out to change the nature of the face-to-face activity (learning things differently?), the other to ensure the content of the face-to-face teaching met the students’ needs more closely (learning different things?). They are presented as two mini case studies.

Case study 1 – ‘Learning things differently’

One microeconomics tutor taught a cohort of 870 students. The original format was a traditional lecture to a quarter of the cohort (200+ students) repeated four times, followed by a seminar with smaller groups of around 30 students. The referral rate on the module was high, but staff resources and timetabling arrangements were not amenable to change. The tutor recognised that the opportunity for interaction, particularly in a crowded room was limited:

So the tutor changed the way the time was used by providing ‘virtual lectures’ in advance of the large class session, which now changed from a traditional lecture to a ‘workshop’ with an emphasis on interaction between students.

So we have ... virtual lectures. which are audio visual multi media presentations, which are available to the students before they have contact with the lecturer on a particular area of work and then in the traditional lecture time we have workshops....they are given actual exercises which are ... based on the content of the lectures... (P18 - economics)

These virtual lectures and workshops are followed by the traditional small group seminars, as before. So even though the contact time and staff resources involved are unchanged, the technology has been used to make the face-to-face time more interactive.

The outcome of this way of changing face-to-face interaction was a marked improvement in student performance. The referral rate reduced by 40%, the students with dyslexia achieved an average of 2 grade points higher in this module than their other studies and the overseas students found the combination of text and narration particularly helpful for developing their language skills.

Case study 2 – ‘Learning different things’

One engineering tutor used a combination of StudyNet, email and Excel to generate and distribute weekly tutorial sheets to around 150 students. The system ensured that although all students were set the same problems, each had unique data sets to work with. This enabled them to discuss the problems, but meant that they could not share answers. The system collected

the students' worked solutions and marked them and returned individualised feedback. The turnaround time for this entire process (from distributing the worksheets to returning the feedback) is less than a week. Each weekly worksheet is directly related to that week's lecture so that once they leave the classroom they are engaged with a supportive process that enables them to work with the subject matter over the next 6 days and then receive almost immediate feedback on their performance.

So what I am doing is I am forcing the students to work on a regular basis, but not just am I forcing them to work on a regular basis, but I am also feeding back to them on a regular basis so they don't have to wait three or four weeks to get the results of their efforts, they get their results within a few hours... (P4 - engineering)

The example so far is one of using technology to 'extend the classroom' in a very effective way, with an element of 'learning things differently' insofar as the students were receiving much more feedback than previously and able to adapt their understandings as the course progressed. But the information that the system provides is also used to inform the content of the next lecture ('doing different things'). The tutor spends the first 10 minutes or so of the next session reviewing areas of difficulty revealed by the data:

So I have got another graph which says to me 80% of the students, for instance, all got questions 1 and 2 right, but only 30% of the students got questions 3 and 4 right... It gives you an instant feedback on where they are struggling and where you can start to provide some remedial work. (P4 - engineering)

This brief description does not do full justice to this development which incorporated various other strategies to enhance the student experience and saw the referral rate on this highly mathematical, compulsory year one module drop from 50% to 23% in one year.

Discussion

The themes presented highlight one of the similarities between different disciplines – all had elements of less clear cut subject matter that students needed to engage with (although the amount varied from subject to subject). It was typical that the students struggled with the more uncertain material. Furthermore, teachers tried to make F2F learning sessions interactive and, in particular, tried to deal with this less clear cut material at times when discussion was possible. Although they generally tried to include discussion and interaction in most teaching settings, this worked best in small groups.

Most teachers were using StudyNet to improve the students' learning experience (for example by providing links to learning additional resources and providing new opportunities for out-of-class communication) – this could

be seen as 'extending the classroom'. Not many, however, were deliberately using the technology to try and enhance the F2F experience and facilitate the interactive learning particularly associated with this environment. Those that had done this had associated their efforts with enhanced student performance and positive feedback from the students.

In order for VLEs to be used to best effect, teachers need to reflect on the advantages that each environment (F2F and VLE) offers and how synergies between the two can be exploited. A useful starting point is to question '*how can the VLE enable the F2F time be used to best effect?*' because interactivity was a key feature of F2F contact and particularly important for the most challenging (higher order) aspects of learning.

However, it is important not to forget that technology can also be used to improve the students' flexibility in how, when and where they study. There is considerable rhetoric at the moment concerning the demands today's students are facing in terms of caring, social and employment. VLEs and other technologies, such as videoconferencing and virtual classrooms can all be used to give students more flexible study opportunities.

This study was carried out in the second full year in which StudyNet had been implemented at the University of Hertfordshire and is a snapshot of the practice of teachers who, in many instances, were new to using the web to support their students' learning. Extensive staff development had taken place and although this considered the pedagogic use of the technology, the emphasis was necessarily on the technical aspects of enabling teachers to use StudyNet. If the study was repeated now, it is likely that more examples of F2F enhancement would be available and their prevalence would be greater.

This is work-in-progress, and these and other findings are helping to inform discussions about curriculum design that exploits the synergies between F2F and virtual environments, as well as meeting student needs more effectively. I would welcome feedback or dialogue.

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Biography

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