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Technology Enhanced Learning on Campus: Insights from EUNIS eLearning Task Force

1. ABSTRACT

In 2010 the EUNIS e-Learning Task Force (ELTF) members collaborated on a review of tools and technologies in use across our member institutions. One of the key features of that paper was the use of technology to give off-campus learners, such as distance learners, those undertaking field studies and learners in the workplace a richly supported learning experience. Building on the success of that collaboration, the ELTF members have turned their attention this year to the use of technology on campus. Whilst technology and distance learning go hand in hand, universities are often slower to take advantage of the possibilities offered by technology to enrich the learning that takes place in our lecture theatres and classrooms. The reasons for this are often cultural as much as financial or technical. Drawing on experience from across the EUNIS member nations we take a look at the types of tools, learning resources and learning activities that are being used to enhance the traditional curriculum, promote deeper learning and bridge the learning that takes place inside and outside the classroom. We look at a range of innovative projects and the benefits they have delivered, ways of overcoming the barriers to technology-enhanced learning on campus and we speculate about the role and function of the campus of the future …

2. INTRODUCTION

This paper is a record of a conversation that started over a year ago and has continued intermittently involving both face-to-face dialogue (in real life and via video-conferencing) and online contributions between the members of the EUNIS e-Learning Task Force. The people involved in this group are all very different yet through their conversations they are finding an increasing number of things in common. They come from many different backgrounds within their universities including IT, Libraries, Teaching, Research and Management. They all share a passion for developing learning within their universities and it is evident from their conversations that this passion goes far

beyond a shared interest in technology. It is much more concerned with education in its broadest sense and learning as a power for social good. The conversation has changed the nature of the Task Force from a formal group that undertook specific time-limited projects (with varying degrees of success) to a more open and democratic network with members collaborating in a number of different areas. The group is indeed taking on some of the characteristics of a CAMEL group: a topic discussed in a separate paper at EUNIS 2011. It is in this context that the reader is invited to join the conversation. This paper remains open on the ELTF wiki and the authors welcome additional contributions from other EUNIS members.

The ELTF looked at the types of tools, learning resources and learning activities that are being used to enhance the traditional curriculum, promote deeper learning and bridge the learning that takes place inside and outside the classroom. Our previous conversation having been hosted by the Open University of Catalonia we naturally talked a lot about distance education and off-campus learning. This year we tried to focus more on the ways in which technology is being used both to solve common problems and to enhance learning on campus. In effect the distinction proved an impossible one to maintain. Recurring themes of flexibility, widening participation and work-based learning kept bringing us back to the need for seamless integration between the on and off campus elements of the learning experience although it did cause us to speculate about the role and function of the campus of the future.

3. WORLD CAFÉ CONVERSATIONS

World Café is a process for bringing people together to work on issues of importance to them. The process has been used around the world in different types of cultures, communities and organisations for many different purposes. It is founded on the assumption that people have the capacity to work together no matter who they are. The emphasis on the process and the value of diversity is different to many other approaches to collaboration that focus on bringing the 'right people' together. In World Café the 'right' people are the people who are there what matters is that you facilitate the right type of dialogue. There are various 'creative commons' resources available in a range of languages to help plan World Café conversations and some of these are listed in the references section of this paper.

World Café conversations are held in pleasant informal surroundings and participants often work in small groups around café type tables with food and drink available to emphasise the social nature of the interaction. The e-Learning Task Force held its second World Café conversation hosted by the University of Porto who provided all of the hospitality needed to create a congenial atmosphere.

Participants may discuss a single question or hold multiple conversations on different aspects of a topic. What is important is the way in which participants get to hear a range of different viewpoints and build upon them. This is achieved by having several rounds of conversation and inviting people to move tables between rounds. Each table has a facilitator or 'Host' who remains at the table while the rest of the group moves on. The Host then briefs the new group on what came out of the previous conversation. He or she will be aided by notes and doodles etc that the group has left behind. As participants carry key ideas or themes to new tables the range of perspectives enriches

the conversation and leads to new insights. A few several rounds of conversation the whole group comes back together to connect the overall themes that have arisen.

We had one participant who was unable to attend the face-to-face session due to an accident shortly before the event and we were able to include him via a video-link. This type of participation does require careful organisation. It was only partly successful in this setting due to interference from the remote microphone. When doing this again we would recommend the ability to mute the remote participant when they are not actually speaking and/or to have a separate breakout room for the group involving the remote participant (although this would indeed detract from the café atmosphere).

Given the importance of the social element of the meetings it is thought that future ELTF workshops may be held over two days running from lunchtime to lunchtime. This will allow participants to follow up the exchanges and ideas that take place over dinner and which prove to be just as important as the more structured elements of the conversation.

4. DELIVERING BENEFITS

It is unsurprising that the ELTF members as a group are convinced of the benefits of enhancing learning through technology. What was encouraging was the extent to which the group were able to relate the benefits to important strategic and policy issues both nationally and Europe-wide. The discussions were wide-ranging but a few major themes ran throughout the day.

Creating and Sharing Knowledge

At the most basic level there was a view that technology enables us to provide access for more people to a wider range of academic content. Most people however felt the benefits went beyond this and allowed us to create better quality Learning Resources. Whilst there were some reservations about the cost of creating the highest quality, most interactive resources such as simulation tools and virtual laboratories, there is no doubt that such tools enable types of learning activities that would not otherwise be possible.

Allowing students to interact directly with remote equipment in real-time is, for example, a means of allowing learners access to specialist equipment that may only be available in a few places in the world. The Universities of Porto, Minho and Coimbra in Portugal share laboratory resources and are working with laboratories and/or lab team networks as far afield as Hungary, Slovakia, the UK and Brazil (for more on this see the work of Restivo *et al* and Soares *et al* in the references section). This group of researchers is also testing a theory that some virtual experiments, if well structured and designed, could actually provide more and better data than many traditional experiments. A good example is the Virtual Michelson Interferometer. The application can be freely downloaded from http://remotelab.fe.up.pt/otherexperiments.html and used on any computer. A short video clip explaining how to use it can be downloaded from http://feupload.fe.up.pt/get/E1HHCps0LYKX71k. This virtual experiment could be used as a training system, anticipating the use of a real interferometer. Other research includes using virtual reality with haptic interaction. This particular area of work was initiated with a Brazilian team from Universidade Federal de Paraíba who tried to

load a cantilever beam located at University of Porto, and were able to feel the reaction force of the beam under deflexion 6.000 km away from experiment. Internet communication delay does however cause problems when using live video for simultaneous observation. At present a virtual beam is being developed for haptic interaction and the team is trying to identify the benefits of such approach.

Even with more basic types of academic content there was felt to be evidence that making the content available in a variety of formats supported deeper learning both in the classroom e.g. by using video clips etc in lectures rather than just Powerpoint and by aiding self-directed learning as students appear to spend more time following up recommended resources when they are presented in attractive formats. Many students would rather watch a video on YouTube than read an article and either are equally valid means of supporting learning provided the resources are of sufficient quality. The work of Santos *et al* (2009) describes the development of thematic modules using a range of different media in order to accommodate the learning preferences of the new generation of students.

In an era where the 'shelf-life' of knowledge is becoming ever shorter, the ability to generate and distribute new information quickly is paramount. The point was made that tutors need to design learning in different ways in order to take full advantage of e-books and other online resources and this is followed up further below. The benefits of online resources are probably even greater in a research context than in teaching. The issue here is not only rapid access to information but also the ability to participate in communities around particular topics.

On a technical level ELTF members are going beyond the assumption that information on the internet is readily accessible and are going to great lengths to ensure anytime, anywhere access to information. The University of Bragança is looking particularly at the affordances of touch screen technologies such as iPads and the new types of learning applications they enable. The University of Zagreb, Croatia is investigating the use of a mobile CMS (Mobile Joomla!) so that content created by the students can be displayed on any mobile browser (iPhone, Android, Blackberry, Nokia or other system). They are also looking at how user-generated content in web 2.0 applications can be incorporated into a wiki (MediaWiki), blog (Wordpress), e-portfolio (Mahara), and online community site (Ning). The Centre for Information and Media Services at the University of Duisburg-Essen has set up an interdisciplinary work-group to work on support for mobile devices as a growing component of the 'technology-mix' on campus.

Scholarly Interaction

Effective use of technology means that tutors and learners spend less time searching for and disseminating information so they can spend more time engaged in what we have termed under the broad heading of 'scholarly interaction'. This could be interaction between teachers and learners, peer-to-peer interaction between learners or engagement in broader communities of practice.

Many ELTF members are from multi-campus universities and are finding that technology can improve the opportunities for direct contact between teachers and learners – as an example the University of Minho, Portugal is making effective use of Skype to deliver tutorials whenever face-to-

face discussion is not possible. The University Pierre et Marie Curie (UPMC), in Paris, has developed, together with Caltech, a professional web videoconferencing system, especially designed for teaching (EVO Learning now called Seevogh Campus), available for all courses. As one ELTF participant put it, technology allows you to have a 'Professor in your pocket' (although it was recognised that such interactions need to take place within defined boundaries as teachers cannot be effectively 'on call' on a permanent basis).
In terms of web technologies, many universities find that Skype is invaluable in facilitating interactions between the teams in different countries. The University of Duisburg-Essen encourages desktop-videoconferencing to save on travel time and expense for meetings. Inter-campus or inter–university lectures are also supported by video-conferencing. There is cooperation between the three universities on the Ruhr (Bochum, Dortmund, Duisburg-Essen) united in the University Alliance Metropolitan Area Ruhr UAMR, sharing tools and servers for streaming and video-conferencing.

At the University of Zagreb, Croatia an online community site *Ning* was effectively used for small groups of part-time students who did not meet frequently in traditional classroom settings. The use of Ning supported the interaction between students, enabled them to create online diaries, and exchange knowledge and opinion on different topics. Ning functionalities like forum, blog, chat, uploading of images and video increased the level of information sharing, informal peer-to-peer learning, and socialisation.

Technology can also improve interaction where group size is large. We talked about some examples of managing large classes and the University of Minho described a low-tech approach to increasing interactivity in lectures by providing students with coloured cards to hold up in response to questions from the tutor. Some form of automated response system is seen as the next step as this offers greater flexibility in posing question and also allows statistical analysis of the responses rather than 'guesswork'. Exeter University in the UK implemented such a system in response to student demand and has prepared a short case study on their experience (see references). At the University of Aarhus in Denmark this kind of automated response system (in the form of Turningtechnologies and 'clickers') is also being used and tested in lectures in the areas of Science Teaching and Social Sciences (this video shows an example of their use: http://vimeo.com/18964579).At the University of Duisburg-Essen a mobile voting system can be borrowed for lectures.

The value of peer-to-peer interaction between learners came up many times in the conversation. The Portuguese universities of Bragança and Minho both have experience of Student peer assessment. Whilst students can sometimes be over-generous in terms of grading one another's work if they are not given good directions, they can equally be very thorough and professional when invited to peer-assess in a structured manner. A competitive element can help: student teams at Minho participated in a design competition and the team members were extremely professional about assessing one another's contributions to the project. Bragança used a wiki for peer-assessment of information systems projects.

The University of Zagreb, Croatia also has an excellent example of peer-support via a wiki. In the *Engwiki* project the students performed various online learning activities in an *English for special purposes* (ESP) hybrid course to produce online content for peer-to-peer learning of ICT industry specific vocabulary. Another example of the of the use of a wiki was related to learning of programming where various algorithms and solutions to programming problems were explained and illustrated on wiki pages with the use of artefacts that were created with web 2.0 tools for making mind maps, flowcharts, and online presentations with audio commentaries.

At the University of Aarhus, Denmark, the use of peer-feedback is an important element in the development of academic staff. During the programme 'GO Online' focusing on technology supported course redesign, teachers (assistant professors, associate professors and professors) are asked to review each other's plans for course redesigns. The results are new course designs developed in collaboration with, and based on, feedback from both peers and professional faculty developers.

Technology can also support scholarly interaction across national boundaries. We have already noted Porto's use of remote and virtual laboratories and this is supporting international collaboration with Brazil and Europe. There is also an excellent example of collaboration between Germany and Poland: a German university seemed likely to have to close an MSc course in a specialist field of archaeology when one of its professors retired but, through a collaboration with the University of Warsaw, it was able to continue with the course with a professor from Warsaw delivering the course online.

Another key benefit of technology–enhanced learning is the ability to support inter-disciplinary teaching and research. The University of Warsaw IBIZA project ensures that all students have the opportunity to study another discipline with their course and some of the virtual laboratory work at the University of Minho is aimed specifically at inter-disciplinary teams working together on projects. The IBIZA project (the Polish Interdyscyplinarna Baza Internetowych Zajec Akademickich stands for Interdisciplinary Base of Internet Academic Classes) is specifically aimed at breaking down barriers between disciplines. IBIZA courses are designed in such a way as to be interesting to and understandable by non-specialists. A committee, supervised by the Vice-Rector for Student Affairs, meets twice yearly to select courses from a pool of submissions by departments. There is a special budget for the project decided by the Senate of the University, which guarantees each person can take at least one IBIZA course while being a student at the University of Warsaw. Moreover, the budget is sufficient to act as an incentive to departments to offer courses for IBIZA. IBIZA not only offers an enhanced range of learning opportunities for students – there is also evidence that having to place their courses into a new context has encouraged academics to improve course design.

Although technology can facilitate all types of scholarly interaction, we heard a warning from UPMC, Paris about the need to rethink the ways in which we mediate this. Currently the organisation tends to identify communities then decides how different tools may fill the social needs of these communities. For instance the organisation (i.e. senate, administrative and academic executives) defines the profile of the members of the community: professors, support staff, bachelor level

students, PhD etc. and, through these profiles, offers different services to each person logged into the university portal. This is a one-way exchange where people have no choice over their role in the community. At the level of the class a learning platform plays the same role: the teacher decides what the students are supposed to do and the tools needed. What is still missing, in many universities, is an equivalent of a Facebook type network where each individual is given the possibility to build his/her own community e.g. a group of students who would like to share notes taken during the class, defining for themselves who is a member of the group. The need for a more mature appreciation of the meaning of communities and how to support them was amongst the messages for the future.

Supporting the Learning Process

All participants were clear that the most important thing we can teach people is 'how to learn' and again technology can have a role to play. We have already noted how better learning resources can encourage more self-directed learning and how peer-support can supplement and enhance student-teacher interactions. This led to some interesting debate on the roles of formal versus informal learning and the extent to which learning needs to be structured and formalised.

The work of Professor Sugata Mitra based on his well-known 'Hole in the Wall' experiments has shown that children have the ability to self-organise and undertake self-directed learning and also that people learn best in groups. His ideas have profound significance for how we design learning experiences but have yet to permeate the formal education experience to any great extent. For the most part, ELTF participants felt that learners who had already undertaken university level study were much better placed to continue their education by online and self-directed means than those who had not previously undertaken higher level study. In part this may related to the predominance of people from scientific disciplines in the ELTF group and their experience that learners need a sound grounding in the theoretical basis of the discipline before they can undertake self-study (Professor Mitra's research on children teaching themselves some fairly advanced concepts in physics is nonetheless food for thought).

Where a structured learning pathway is necessary, technology can help to make sense of the learning experience for both teachers and students. The Newcastle University Dynamic Learning Maps project in the UK (see references) grew out of a recognised problem in the medical faculty that many tutors taught a very small part of a course and did not understand how the course as a whole fitted together. This led to overlap, duplication and gaps in the curriculum and made it difficult for learners to understand where any particular topic or activity sat in relation to the course as a whole. Dynamic Learning Maps has created some open source tools to help both learners and teachers visualise the curriculum. The basic tools have been enhanced with 'Amazon-like' features that permit the rating of resources.

It is clear that, however confident we may be of our learners' ability to direct their own learning, in order to take advantage of the affordances of new technologies we need to think differently about how we design learning experiences. In the UK JISC has funded a four year programme of projects that aim to transform curriculum design. This was complemented by a two year programme looking

at innovative examples of curriculum delivery and many of the UK examples in this paper are drawn from that programme (for outputs see The Design Studio in references). The message about effective curriculum design was made very strongly by the University of Zagreb which won a EUNIS Award in 2008 for the quality of the learning activities it designed using innovative tools. At this university various web 2.0 tools are being evaluated with the use of different learning scenarios for specific courses.

We heard of many examples where high quality learning resources in the form of interactive e-books etc had been made available to students who did not use them to best advantage e.g. printing out e-books rather than using the interactive functionality. The case was made very strongly that this issue needs to be solved by good learning design and that learning activities should require that students not only find information but also analyse that information for themselves. Interestingly there were many participants who felt that the implementation of the Bologna process has actually inhibited good learning design by fragmenting the curriculum.

Unsurprisingly the conversations about the learning process came back time and time again to the question of assessment. Many learners come into higher education wanting accreditation rather than education and the issue of 'What motivates learners?' regularly elicits the response 'Whatever is assessed'.

The University of Warsaw is using formative e-assessment to ensure that students enter programmes of study at the right level. The University recognises the value of e-assessment as both a formative tool and a feedback tool and is actively working to increase the level of self-assessment by students. The University is using similar approaches to gain feedback on its own activities and has moved toward asking more open questions in its feedback surveys in order to promote more reflection by students. For example if a student answers 'Yes' to the question 'Would you recommend this course to a friend/colleague?' they are then prompted to answer 'Why?'. This approach gives much deeper understanding of the responses than simple statistics could ever produce.

An ongoing project at the University of Porto aims to articulate two areas of education and technology: e-learning and computer-based tests. For many decades multiple choice questions or other types of questions that allow automatic grading were used in exams through the University. Consequently, a continuously growing set of calibrated items has been built. Computer Based Assessment was a smooth and natural evolution now used by a number of teachers.

eExams are another useful addition to digitally-supported learning. The University of Duisburg-Essen equipped a room with 196 places to be used for eExams under controlled conditions. In non-exam times, the room is available as a PC pool to students hence the name of the room PC-Hall/Online Exam Centre. The professional software, LPLUS, may however also be used from other PC pools to extend the scale of an eExam. An interface with Moodle permits the export of exam questions from LPLUS into the test or lesson activity in Moodle for practice tests (the reason for using LPLUS in this case is because it guarantees a higher degree of security).

At the University of Zagreb, Croatia the e-portfolio system Mahara is being used for assessment purpose. Instead of writing essays or project papers the students are asked to create e-portfolio views with digital content (theoretical text, illustrations, mind-maps, block-diagrams, documents, collections of links to online resources, online presentations with audio commentary, embedded video etc.). Such student-created online content is shared with other students for peer-to-peer learning.

Facilitating Flexibility

Flexibility was probably the word that came up most in our discussions. All of our member universities are experiencing the need to be more flexible in terms of their curriculum offerings and how they deliver them. The School of Technology of Setúbal Polytechnic in Portugal has developed a blended learning methodology called 'Flexlearn'. This approach allows students to decide whether or not they participate in face-to-face classes yet ensures they undertake the full range of learning activities whatever mode of study they use. Flexlearn is seen as the way forward by Setúbal: the course redesign it has prompted has resulted in better quality courses and it is hoped that the approach can soon be applied to all courses at the institution.

The FlexLearn methodology is based on six fundamental principles described below:

- *Student choice:* without choice there is no flexibility so, for each mode of participation, the activities are described and scheduled so as to ensure they provide students with the possibility of choice.
- *Activity descriptors and attendance requirements:* some activities may require the student's physical presence in the classroom, for example to perform a test or an experiment in the laboratory. The teacher should explain in the discipline plan the activities and times when all students, including those who opt for online participation, must be present in the classroom.
- *Equivalence:* this means the provision of equivalent learning activities in all participation modes. Alternative participation modes should lead to equivalent learning. Equivalence, however, does not imply equality. For example, a forum discussion on a proposed topic may be socially less rewarding than the discussion on this topic in class. In each case, notwithstanding, students should be challenged to reflect on the learning content, contribute with their ideas for discussion and interact with their peers.
- *Reuse:* learning objects, specifically created for each type of participation should be reused for all students. Many of the activities that take place in the classroom can be captured and made available on the learning platform. Podcasts, videos, files of presentations that result from activities conducted in class attendance can be useful for students who opt for online participation. Similarly, the activities undertaken by students online, such as those reflected in conversations in chat rooms, asynchronous discussion forums, work groups, glossary entries, can be important learning material for students following the attendance mode. Learning objects that result from activities undertaken by students in different ways, should therefore be provided as study elements for all students.

- *Support*: the teacher should ensure support mechanisms for students are equally effective in both modes of participation .In both modes, the teacher should ensure mechanisms that allow the students to ask for information and clarification. In on-campus mode, students can ask questions in class and, furthermore, the teacher usually reserves a time to deal with one-to-one queries. For the online mode students, the teacher should provide mechanisms, such as a forum for questions or a schedule for synchronous chat.
- *Good practice:* In both participation modes the teacher must follow a set of procedures that are accepted as good practice. Teaching quality assurance is largely by the observance of good practice ensuring the most appropriate practices are applied for each teaching mode.

The School of Technology is now looking at how social networking tools can be applied in the Flexlearn methodology so they can use the kind of peer support mentioned earlier to enhance the learning experience still further.
Flexibility is also an issue for the University of Duisburg-Essen in Germany due to the high percentage of its students who need to work to finance their studies. The University has traditionally seen itself as a 'presence university' with distance learning elements as an enhancement to class-room teaching and is now undergoing a process of major change to come to terms with being a different kind of educational entity to accommodate part-time studying by extending 'blended learning'. The blended approach is becoming the norm. The university recognises the need for continuing investment in its physical learning spaces but the vision is now very much about seamless integration throughout and beyond the campus. The amount of culture change involved for teachers should not be underestimated. The point was made that merging the classroom experience and online learning into a new blend of the two is not easy even if parts of your university excel at each of these areas.

In general it was seen as becoming increasingly unrealistic to expect the learners of the future to attend campus at specific times of the day to engage in activities that could be carried out just as well anywhere – these types of activity relate mainly to the passive absorption of content. Learning needs to by anytime, anywhere where this is appropriate. Coupled with this is of course the desire to reduce the amount of learning activities that involve 'passive absorption' of content and replace them with engaging and interactive learning design that stimulates deeper learning.

The implications of this type of flexibility and anytime, anywhere learning extend naturally to the assessment process. This type of learning demands more continuous assessment with the emphasis shifting from summative to formative activities. Technology is also important in supporting the self-directed learner by helping them keep track of deadlines and assessments and helping identify learners in need of additional support.

Related to flexibility is the issue of personalisation. Technology can aid the personalisation of the learning experience – one participant likened this to adjusting the equipment in a gym to suit different people.

Facilitating Mobility and Transitions

Along with flexibility came the recurring themes of mobility and transitions as key areas where technology makes a real difference to what we are able to offer. The priorities may be significantly different depending on the institutional context but we unearthed a range of areas where change was taking place.

The University of Duisburg-Essen provided an interesting example of a recent survey with students asking for greater levels of standardisation in tools and course offerings so that they could more easily combine learning in different subject areas without the differences in approach and tools becoming barriers to such movement. This will be one of the issues in the discussions on IT and learning strategies presently underway at the university.

In part this theme was about managing the increasingly heterogeneous student body. Students from different school backgrounds can come to a course with a vastly different set of prior learning experiences. This could be a particular issue in countries such as France which does not have a selection process for undergraduate study – any student who passes the baccalaureate has the right to enrol on the course of their choice at university (although here there is a heavily standardised curriculum); it is certainly an issue with many international students. The use of technology to profile students on enrolment (as in the Warsaw example) and the use of technology to support particular skills development needs (such as language tuition) is the only practical way to 'level' out' these differences and give all learners a more equal chance of making the most of the available learning opportunities.

Facilitating transition is also about supporting moves between different types and levels of learning e.g. school to university, undergraduate to Masters level, taught courses to research. It is however about more than that: it is also about transition in ways of thinking and developing skills to undertake the appropriate kind of thinking be that self-directed, scientific, project-based or work-related.

Understanding Learner Needs

In part the obvious distinction between a generation of learners that has grown up with a diverse range of technologies in everyday use and teachers who are still struggling to come to terms with the benefits of technology, has led to the situation where we realise the importance of understanding learner needs and listening to 'the learner voice'.

Although technology may have been a driver in prompting us to listen to the learner voice, not all of our learners are 'Digital Natives' (if such a species exists) and indeed the need to get to grips with new technologies is emerging at the same time as the need to respond to the needs of an increasingly diverse student body. Initiatives in both Portugal and Germany are targeting senior citizens and the University of Duisburg-Essen has a high percentage of learners from migrant families and who need to combine work and study. The university is thus very much concerned with exploiting the potential of diversity and a Pro-Rectorate for Diversity testifies to this commitment.

The University of Exeter, England realised the important role students could play in moving the university forward and began a project called 'Students as Agents as Change'. The university used students as researchers to investigate how the learning process could be improved (particularly using technology) and plan, organise, run and evaluate pilot projects. The University was actually an unusual location for such a project as it is a very traditional university which has no problem recruiting good quality students and no evidence that students were dissatisfied with the status quo. The results were however quite astonishing. One of the biggest impacts was the successful trial of electronic voting systems to increase interactivity in large lecture groups. As a result of the project one faculty purchased 8,000 of the voting handsets. A 'Students as Change Agents' network now exists in the UK to share ideas and good practice.

Many other universities are using technology to better engage with learners, the University of Minho recently moved all of its paper-based feedback processes online and we have already noted how the University of Warsaw not only collects online feedback but does so in a way that prompts student reflection on the learning process.

5. OVERCOMING BARRIERS

With many innovation activities there are often barriers to be overcome before the full benefits of the innovation can be realised. With so many clear examples of how appropriate use of technology can enhance learning we looked at some of the barriers to making the most of the possibilities and, more importantly, some of the ways our members are overcoming them.

Digital Literacy

We discussed the issue of digital literacy and concluded that the issue in relation to learners is less about technology and more about 'learning literacies' in a digital age. Most people are comfortable with using a range of technologies in their everyday lives although their degree of enthusiasm for, and confidence in, trying new things does appear to vary not least (but not only) according to age and gender. Even young learners who have grown up with technology may not however be readily capable of applying good judgement as regards the usefulness of tools and resources. Again we come back to the issue of good learning design and also to the idea that students need to be taught how to learn and that means developing a range of skills around finding, evaluating, using and integrating information from a range of online sources.

An important part of developing learning literacies is the ability to understand and respond to feedback from teachers. In the UK a national survey of students is conducted every year and it consistently identifies low levels of satisfaction with feedback from tutors. Tutors, on the other hand, often feel that students are unable to recognise when they are receiving feedback to aid their development and that they often look only at the final mark. The University of Westminster tried to tackle this problem in a project entitled Making Assessment Count. It introduced an online system for submission of work and provision of feedback in order to speed up the process. It also required students to keep a reflective log discussing how they approached each assignment, what they learned from it and how they reacted to the tutor's feedback. The project was very successful and is now being trialled by a number of other universities.

Change Management/Staff Development

The issues in relation to staff are probably even more complex. Education is a field that has been relatively slow to adapt to the introduction of technology and many teachers are still resistant to change or do not adapt beyond a very basic level, namely, providing lecture notes in digital form. There is no single reason for this but lack of time and the particular university culture are significant factors. Most participants agreed that staff attitude was the major barrier and most agreed that the most effective lever to pull in this case is student pressure (although is it also important to provide effective support for teachers and learners). Lecturers do respond to the needs of their students and, as in the Exeter example, where students themselves are able to articulate the benefits of applying new technologies academics are often more positive than when the pressure for change comes from other sources. As a result of the work with Students as Change Agents, Exeter responded to fear of technology and pressure on lecturers' time by creating a staff development course covering '8 Technologies in an Hour.'

Cost-Benefit Analysis

It is interesting that cost did not feature as top of the list of barriers to be overcome. Most people felt that their universities can always find money for things that feature as high priorities and that the problem with asking universities to invest more in technology is that we are not always good at explaining the costs and benefits to senior managers. Having said that most people felt that the imperatives of increasing flexibility and meeting the needs of new types of learners were major drivers and it was recognised we cannot achieve this without the effective use of technology. The role of technology in widening access to learners with disabilities is also a clear argument for investment. There are however some clear examples where universities have done cost-benefit analysis of their return on investment. The University of Warsaw has concluded that moving to online provision of foreign language resources has allowed it to cut costs to the extent where it has been able to double the number of learning hours offered free to students i.e. without the introduction of fees. The University is also looking at how more effective integration of technology with good course design can cut costs e.g. by re-using resources produced by the most expensive teachers. Such evidence may be an important factor in moving forward policy in a country where government regulations restrict the amount of tuition a university can deliver via e-learning. JISC infoNet has also produced an influential report of the cost benefits of e-learning across a range of UK universities (see references).

6. LOOKING TO THE FUTURE

Although we started out with the use of technology on-campus as our theme, it soon became clear that the distinction between on and off-campus technologies was impossible to maintain. Most of our universities are seeing these boundaries blur. Seamless integration of the physical and virtual aspects of the campus is now the vision for many of us as we want the flexibility and enhancement opportunities that this blend can offer.

This led us to consider two important questions: Is the physical campus becoming less important and are teachers becoming less important? The conclusion in both cases was a resounding 'No'.

We are essentially social beings and the social elements of learning are key to designing the physical campus in ways that will support the learners of the future. This was very evident in a visit by the ELTF to the e-Learning Café at the University of Porto. As Universities face the growing pressure to deliver high standards of education, the efficient and effective use of their physical learning spaces is paramount for being able to provide effective environments and facilities for learning and studying. The concept behind the e-Learning Café and its spatial configuration aims to encourage several types of group interaction for socialising and studying and promoting interdisciplinary exchange of knowledge and experience. Within the space people can experience a set of diverse social and cultural events such as courses, readings, performances, workshops and other activities. The e-Learning Café is an excellent example of student-centred space, rich in technology, that supports social learning. Students have a real sense of ownership of the space and are able to propose social and cultural events as well as being permitted to move furniture etc to help them work in ways that best suit them. A clear example of academic impact is in fostering an increase in inter-disciplinary collaboration e.g. a group of medical students engaging in work around the properties of materials with engineering students without any prompting to do so by tutors. One important characteristic of this environment is the duality of its physical and virtual nature (the building and its Internet site), which, linked together, create a richer relational dimension. The result is allowing communication between people who may be seated far apart and a strong interrelation of ICT with space design, allowing for different types of spatial use and functions. This is only one example of many such developments taking place across Europe at the moment. A comprehensive guide to planning and designing learning spaces has been developed by JISC infoNet drawing on a wide range of examples from the UK (see references).

The need/role for a teacher may change at different levels of study but the need will always remain. No technology can ever be as versatile as a teacher. Whilst certain types of learner (especially those at higher levels or with previous university experience) can manage self-directed learning very well, many participants felt that education will always remain a 'push' rather than a 'pull' activity. That is not to say we should not be making the most of student peer support and other types of scholarly communities. Examples from the University of Zagreb illustrate these points very well: at lower levels of study the students need more guidance and are often not qualified to produce quality content for peer-to-peer learning, yet at higher levels of study (5th year of Bologna), students are developing high quality content that can be used as online learning resources for other learners. The University is particularly interested in the idea of user-generated content and the opportunities to use content generated by students to aid teachers in other educational establishments such as schools and possibly even the wider public. We saw a similar example in the 'Reuse' principle applied in the Setúbal Flexlearn model.

Whilst the workshop participants were already looking to the benefits that can be delivered by the affordance and interactivity of Web 3.0, it is evident that there is still a lot of work to be done in terms of understanding how best to use collaborative tools to facilitate scholarly interaction. The warning from UPMC that we cannot derive real benefit from these tools if we try to structure them in a hierarchical way and over-manage them rings true for many of us. On the other hand we do not want recreate (or even simply adopt) Facebook. The crux of the matter for many is how to enrich an

essentially formal learning experience with the *methods* of social media. This is not the same as simply making tools like Facebook available and the point was made that we should be careful not to blur this distinction ourselves.

Whilst neither teacher nor campus appear likely to be relegated to history in the near future, learning is much more likely to be a blend of on and off campus, formal and informal and integrated into work and home life in different ways. Learning resources may come from a range of sources – some of which include resources generated by other learners and we may engage in a range of scholarly communities some of which include people we may never meet. There was much talk about 'Just in Time' learning and 'Bite-Sized Chunks' of learning and indeed the whole 'business model' of funding education may change. The range of options we now have through technology-enhanced learning may allow us to offer a range of options from offering free Open Educational Resources (OERs) for self-study as a public service to charging self-directed learners for assessment/accreditation through to a tariff system for participation in classes and tutorial support (see references for a suggested 'Open Learning' model by the University of Bolton).

All in all it is an interesting time to be working in enhancing learning through technology as we develop both our physical and virtual campuses to meet a changing set of learner needs. We hope that some of our examples of delivering real benefits will inspire others and we look forward to engaging with an ever wider set of EUNIS member to take the work of the ELTF forward.

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