Visual Learning Lab

A Showcase of Innovations in Visual Learning

The University of Nottingham

HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND
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www.visuallearninglab.ac.uk

Preface

The Visual Learning Lab (VLL) is one of 74 Centres for Excellence in Teaching and Learning (CETLs) which were funded from 2005-2010 to showcase and develop excellence in learning and teaching in higher education.

The CETL initiative has been both exciting and dynamic initiative, and within it the work of the VLL has been extremely wide-ranging. This report pulls together a few snap-shots of the type of work which we have been able to develop. Together they provide a flavour of leading-edge innovation and practice, which is in each case designed to enrich and promote enhanced student learning within higher education.

It is gratifying to look back at the last few years and through this report see such an array of worthwhile developments. There are some common themes, such as the way in which visualisation can be a vital aspect of student learning in so many areas and disciplines, as well as great diversity in the areas of technology, the style of learning, and the subjects being taught. In every case there have been considerable levels of collaboration between ourselves, as the VLL core team members, and the colleagues throughout the University of Nottingham who have worked with us in developing their specific initiatives. Although this report does not include work from every single academic discipline in the University, it does range across many contrasting situations. Hopefully all those who read it will find ideas that could apply to their own work. Collaboration and sharing initiatives have been hugely significant parts of the success of the VLL, and hopefully this report will add even more to that ongoing process. Many of the contributors to this report are willing to share more about their experiences with those who want to contact them. In addition the VLL team is keen to widen its network of initiatives and build even further on the work outlined here.

The University of Nottingham has clearly gained a great deal from the CETLs initiative and this report gives a range of insights into some of the VLL-related parts of that work. I would like to thank and congratulate all those who have contributed to it and hope that its influence will spread far and wide. Although the majority of this research and development work has occurred within our own University, its significance as a contribution to the enhancement of student learning is of relevance to a wide audience of scholars, teachers, learners and researchers.
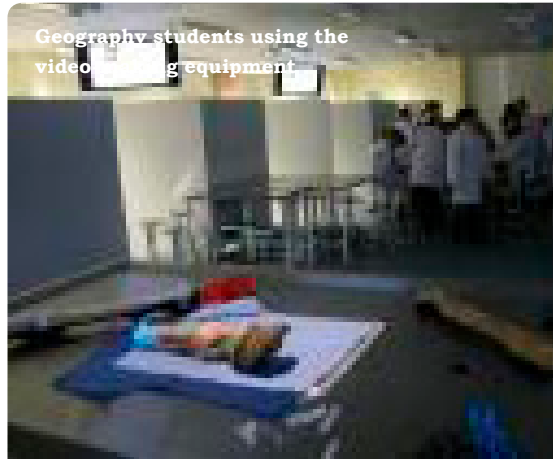
Finally I would like to congratulate Sarah Kerr who has led the production of this publication.

Professor Roger Murphy
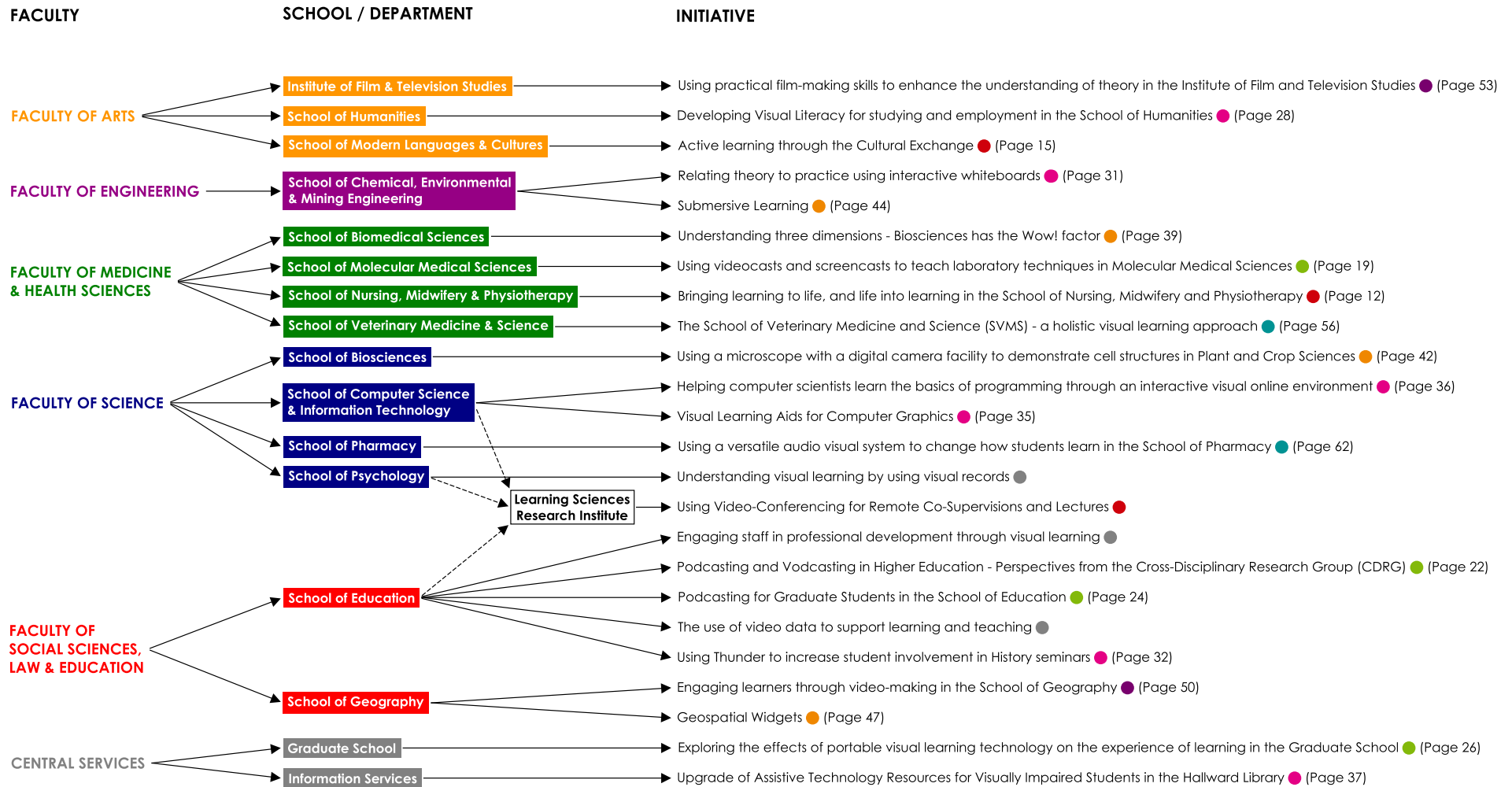**Director of the Visual Learning Lab**

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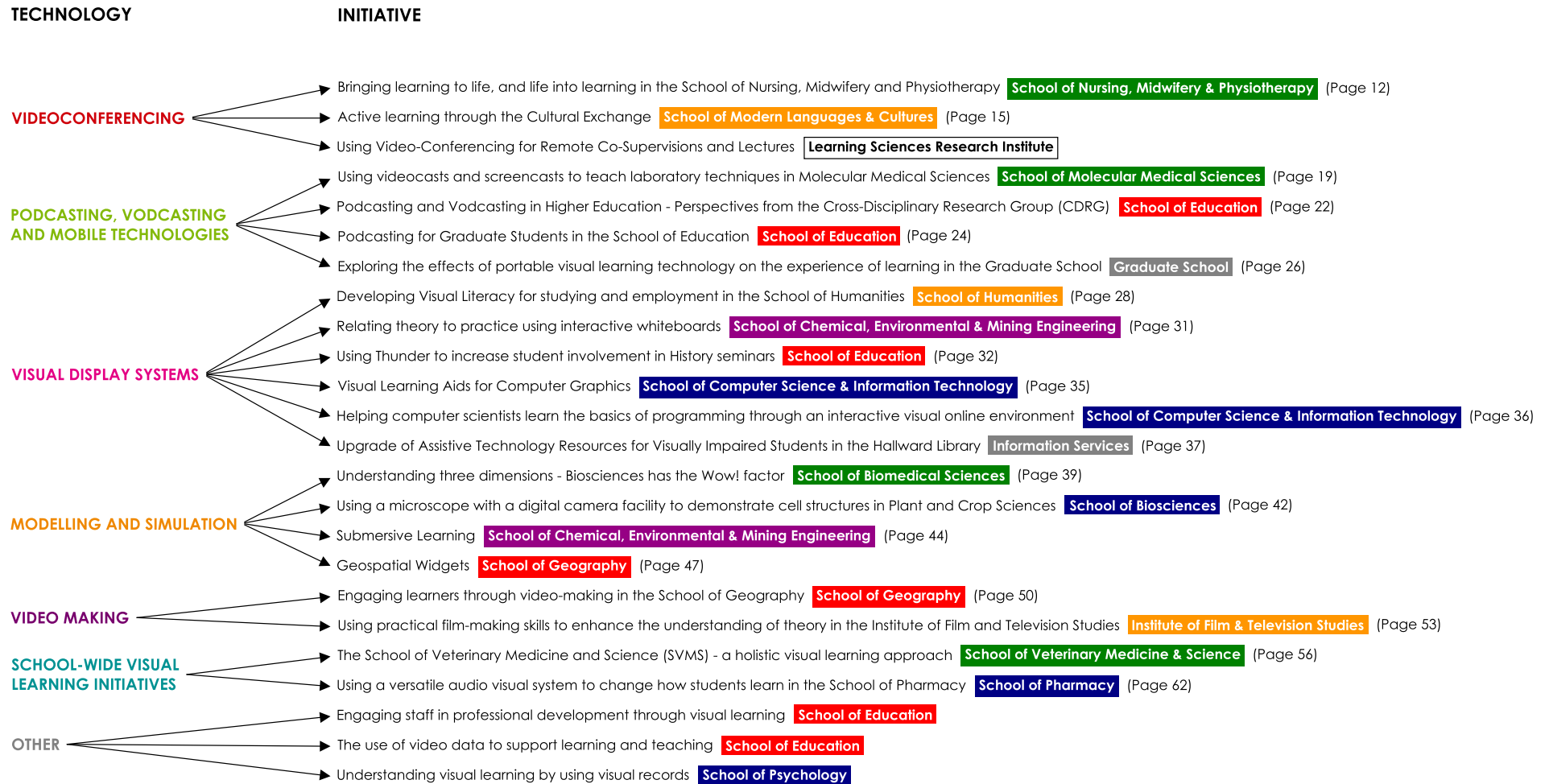
KEY TO TECHNOLOGIES: ● Modelling and Simulation   ● Podcasting, Vodcasting and Mobile Technologies   ● School-wide Visual Learning Initiatives   ● Videoconferencing   ● Videomaking   ● Visual Display Systems   ● Other

Map 2: VLL Initiatives by Technology

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The use of video data to support learning and teaching School of Education

Understanding visual learning by using visual records School of Psychology

KEY TO FACULTIES: ● Faculty of Arts ● Faculty of Engineering ● Faculty of Medicine & Health Sciences ● Faculty of Science ● Faculty of Social Sciences, Law & Education ● Central Services

From research to implementation - The Visual Learning Lab Team

This report looks primarily at collaborative VLL work undertaken with colleagues located in many different parts of the University of Nottingham. In addition to this work, the VLL's core team contributes to research into visual learning and technologies in key areas: the use of video-clips and photography; the use of videoconferencing in HE; virtual flipchart technology and other visual display systems. The research scope of the team is further enhanced by a group of PhD students working in the areas of visual mind-mapping, student-centred and collaborative approaches to visual learning, visual aids for teaching, and the role of visual technologies in implementing changes to teaching. On a grass-roots level, the VLL's role as the ambassador for visual learning within the University is assisted by student interns who work at the interface between both staff and students, demystifying technologies and providing support and training in their use.
Welcome to the team!

Professor Roger Murphy

Role: Director

Professor Roger Murphy is Director of the Visual Learning Lab. His areas of interest and experience include educational research, evaluation and assessment. He has a strong interest in educational innovations, which open up new ways for people to learn effectively. From that starting point he has become increasingly interested in visual approaches to supporting learning. His own research work often includes photography and videoing. He finds these approaches can often complement other forms of research data, and can often have a powerful role in sharing research insights with others. He also has experience of using video clips to stimulate personal reflection and learning, and has been very involved in the development of the Promoting Enhanced Student Learning (PESL) website within the University of Nottingham. The PESL website aims to share novel approaches to teaching and learning in higher education through video clips, which both illustrate the teaching innovations but also include lecturers' reflections on them.
As well as his work in the VLL, Professor Murphy is also Director of the Institute for Research into Learning and Teaching in Higher Education (IRLTHE) and the Centre for Developing and Evaluating Lifelong Learning (CDELL). He is also a past President of the British Educational Research Association (BERA). His current research includes a number of studies of innovative pedagogical practices in various disciplines within Higher Education.

Professor Do Coyle

Role: Co-Director of the VLL March 2005 to November 2008 and now Professor in Learning Innovation at the University of Aberdeen

Formerly Co-Director of the VLL, Professor Do Coyle left the VLL and the University of Nottingham at the end of September 2008 to take up a new post at the University of Aberdeen as Professor in Learning Innovation (Education). Do and her colleagues in the School of Education were responsible for the development of the Interactive Teaching and Learning Observatory which is the inspiration behind several of the videoconferencing-based initiatives discussed in this report.   In her new role, she is working on developing 'Connected Learning' and in particular, capacity-building around technology-enhanced learning spaces in a range of different contexts. Connected Learning spans classrooms and schools, HEIs and government agencies through action research, empirical research, innovation and development.

Dr. Rolf Wiesemes

Role: Senior Research Fellow

Dr Rolf Wiesemes is responsible for co-ordinating, supporting and developing all VLL projects and capital VLL initiatives across the University of Nottingham in collaboration with the VLL core and management teams. He is also involved – together with the rest of the VLL team – in representing the VLL both internally and at external conferences and VLL-related events. Apart from his general interest in visual learning and the related use of technologies for supporting visual learning, Rolf's past and current research work focuses in particular on the use of video conferencing in schools and for teacher training and development through his work in the Interactive Teaching and Learning Observatory. Rolf is currently developing case studies of visual learning in theory and practice.

Dr. Brett Bligh

Role: Learning Research Systems Developer

Dr Brett Bligh seeks to investigate visual methods which support communication between learners and tutors, either by allowing for the more effective interchange of ideas using innovative representations and mediating technology, or by allowing for the construction of arguments, narrative and ideas by harnessing visual approaches and technologies. Working with Multi-Display Environments such as PolyVision Thunder™, Brett seeks to promote more effective interaction between tutors and learners, and between learners themselves, in a variety of learning scenarios across a variety of course disciplines. Furthermore, Brett seeks to investigate the interface between tutors, learners, scaffolded scenarios and interactions, and the space within which the activity occurs. In keeping with these key interests, Brett's work on the use of video-editing for learning focuses simultaneously on students' learning of complex technical tools and their use of those tools to construct argumentation and narrative.
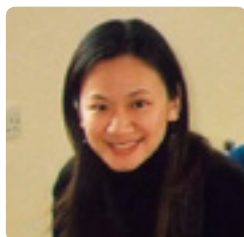
Dr. RuoLan Wang

Role: Research Fellow

Dr RuoLan Wang joined the team in January 2009, having obtained a PhD in Education from the University of Exeter (2007). With a keen interest in generating an evidence-base for teaching and learning and, particularly, assessing the impact of technological interventions with an educational component, RuoLan works collaboratively with members of the VLL and the Institute for Research into Learning and Teaching in Higher Education (IRLTHE) teams to develop visual research methods and participate in studies designed to expand understanding of visual learning in higher education.

RuoLan's main responsibilities consist of developing new research proposals, conducting research studies and contributing in a wide range of dissemination activities. She is also involved on a 3 year Higher Education Academy (HEA) funded project into 'Enhancing Learning in Clinical Work Placements', working together with colleagues in the University of Nottingham, School of Veterinary and Medical Sciences, the University of Nottingham, Centre for Social Research in Health and Healthcare (CSRHHC), as well as a research team based at the LIVE Centre in the Royal Veterinary College in London. Prior to her current role, RuoLan was working in the Education Enhancement Unit at the University of Exeter on a research project evaluating the impact of video and conferencing technologies on undergraduate provision.

Marian Anderton

Role: Manager

Marian Anderton works closely with the core team to develop and operationalise its initiatives. Marian has years of experience as an administrator both in the HE sector and the NHS. She is supported by Joanne Towle. Joanne is an experienced project administrator with expertise in finance.

Joanne Towle

Role: Administrative Officer

Sarah Kerr

Role: Freelance Communications Work

Sarah Kerr works for the VLL on communications and was responsible for the production of this report. She has worked in HE for ten years and is currently the (job-share) Manager of the Arts Graduate Centre.

Andy Coverdale

Role: PhD Student

Andy worked as a shipyard fitter before returning to education as a mature student. After graduating in Technical Illustration at Blackpool and the Fylde College, he gained experience in commercial illustration, graphic design and 3d modelling. He undertook an MA in Interactive Art and Design at University College Falmouth, focusing on education.

Andy was subsequently employed at the Interactive Art and Design Research Cluster to research e-learning technology and trends within Art and Design. He was also involved in a college-wide Learning and Teaching research project running a series of prototype workshops for student digital portfolios.

Andy is interested in student-centred and collaborative approaches to visual learning, and the potential applications of visual mapping and emerging social computing in Higher Education.

Richard Laight

Role: PhD Student

After a 25-year first career in public relations and commercial copywriting, Richard re-trained as an EFL teacher in order to travel and experience other cultures. It was while working as an English language teacher in countries with widely differing approaches to education (as well as beliefs and social customs), including Taiwan, Thailand, Oman and Morocco, that Richard first became intrigued by the practical value of visual aids and materials as part of the learning process - and for language teachers in particular.

Richard's research explores the use of video recordings in continuous professional development of TEFL and foreign language teachers. He is particularly interested in finding ways to develop intra-teacher professional dialogue as a more democratic form of training as opposed to top-down approaches.

Claire Mann

Role: PhD Student

Claire holds a first degree in Business and graduated with a postgraduate teaching qualification from the University of Nottingham. Her background is teaching IT to adults across a wide range of sectors. This includes providing training to blue-chip clients, providing work-based training for young disaffected adults and teaching disabled adults in the voluntary sector.

Claire became interested in visual technologies and the issues of teaching IT to teachers and joined Bilborough College as Staff IT Trainer with a dual role of supporting teachers to develop their IT skills and assisting the college with their model of change management taking the college forward to an e-learning environment. Claire worked as a Research Assistant on the University of Nottingham V-Resort project developing video resources to be used in Higher Education.

Claire is interested in all areas of implementing change in teaching using IT with visual technologies. This includes using technology generally and more specifically the potential in teaching to use laptops, the internet, IWBs, video resources, RLOs and mobile learning opportunities. Following her sponsored year with the VLL, Claire has been successful in gaining a PhD studentship which will be dual supervised by the VLL and the new Vet School. This research is looking at the student experience of new visual learning technologies offered by the Vet School.

The VLL student intern team

The Visual Learning Lab (VLL) has been working with a group of five student interns since June 2008, with an additional three due to come on board as this report goes to print. Student intern work is diverse; they can design, facilitate and deliver workshops, or provide training and support for both staff and students, for example. Each brings their unique specialism and dynamic abilities to the team.

Part of their work to-date has been focused on finding out how the VLL team could work more directly with students, and get student innovators involved in using visual technologies. This is currently being facilitated through student focus groups.

The University is a dispersed institution, and students and staff who are not based at University Park can feel isolated. For example, Claire Mann is a VLL intern who is currently being sponsored by the School of Veterinary and Medical Sciences to do a PhD in the use of visual technologies in Veterinary education. She is training up other VLL interns in the making and editing of videos, and these interns will now be supporting students at Sutton Bonington campus in their video-editing work.

Another part of their work involves working with Schools across the University to demystify existing classroom technologies, or to explain the applications of new learning technologies and related pedagogies. They have already been in to Mathematical Studies, Education, Graduate Entry Medicine, Humanities, Nursing, Biosciences, Pharmacy, Midwifery, Graduate School, Civil Engineering, SVMS, and CELE. If you think that you would benefit from their support, then get in touch with them through **vll@nottingham.ac.uk**

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Videoconferencing

Uses for Teaching and Learning in Higher Education – An overview

Dr Rolf Wiesemes

Videoconferencing is not new. However, it is only relatively recently that the technology is sufficiently developed for it to be used for learning and teaching purposes. This section focuses on pedagogically embedded uses of videoconferencing for learning and teaching both at the University of Nottingham and further afield

The increasing quality and reliability of videoconferencing, its ease of use and cheaper availability, make it a powerful tool for linking learners in a wide range of settings, and offers supported learning opportunities not easily available otherwise. In this sense, videoconferencing in its different forms (ranging from High Definition video conferencing via IP to freely available Skype or iChat links) is capable of truly global links between a range of partners.

Additionally (and just as importantly), videoconferencing can act as a time-saver and has a range of environmental benefits such as reducing travel and related air pollution.

Videoconferencing is not just a tool for shared observation. It is also a means for facilitating interaction over distance, and a means for developing dialogue between a range of participants - e.g. teacher trainees, teachers and students, or nursing students,

nursing trainers, nurses and patients. These new contexts bring with them unique pedagogical and ethical concerns. Here, Brenda Rush (School of Nursing, Midwifery & Physiotherapy), and Oranna Speicher and Maryse Wright (Language Centre) discuss two very different approaches. In section six of this report, Dr Richard Hammond and colleagues from the School of Veterinary Medicine and Science also look at the value of videoconferencing in teaching and learning in the context of the Vet School.

Bringing learning to life, and life into learning in the School of Nursing, Midwifery & Physiotherapy

Connecting staff and students in clinical settings over distance

What was the teaching and learning issue that you sought to address?

We were inspired by the Teaching and Learning Observatory (iTLO) developed by Professor Do Coyle and colleagues in the School of Education. We wanted to see if we could implement it in a healthcare clinical practice setting because of our need to help students to link theory to practice.

What did you actually do?

We talked to colleagues from the iTLO project in the School of Education to get some background about the practicalities of the system. I then asked what people here in the Division of Nursing thought about the possibility of student nurses being able to watch live practice in a clinical area. Although there was concern about consent, colleagues could see the potential.

I made contact with Nikki Walsh, a lecturer at the Boston centre, who had connections with a diabetes clinic in Lincolnshire. She knew the specialist diabetes nurse, who helped us get the permissions we needed. I then wrote an information sheet for the patients and together we wrote a letter inviting patients to a group education session to prepare

Dr Brenda Rush

Role: Associate Professor in the School of Nursing, Midwifery and Physiotherapy

Teaching Responsibilities: Mental Health Nursing

Personal Profile: Brenda is a programme leader for the Diploma/BSc in Nursing (mental health). She chairs the Pre-registration Mental Health Curricula Advisory Group and the Service User and Carer Advisory Group. Her research interests focus on user and carer involvement in nurse education and she is currently leading the videoconferencing project, which is supported by the Visual Learning Lab.

At a glance:
The Interactive Teaching and Learning Observatory (iTLO):

The iTLO connects learners, teachers, student teachers, teacher trainers and researchers in different sites in different countries via videoconferencing facilities for a range of purposes. Its uses range from supporting new student teachers by offering them 'live' observations of lessons (as a means to illustrate and exemplify practice) to collaborative action-research projects jointly led by researchers, teachers and learners.

Initially part-funded by the DfES Training Schools Initiative, the iTLO is a regional, national and international network. It uses and integrates a range of additional interactive technologies to support the development of learning communities.

them for taking insulin for the first time.

The idea was for the students to have a lecture on the biological basis of diabetes and then to link with the clinic via the videoconferencing system. There were immediate and obvious advantages to this. Firstly, not all of our students could get into the small clinic, whereas on the first occasion using the videoconferencing equipment we had four patients, one carer and the diabetes specialist nurse in the clinic, with 16 students in the classroom, all of whom could observe.

During the clinic the nurse showed the patients the 'pens' that are used for injecting insulin. The students had the same equipment in the classroom and were going through the same procedures. They could do it at the same time. At the end, the students could ask questions of the patients, the carer and the nurse. The evaluation was really good. The students felt it was 'a respectful and ethical way of learning with patients', and 'a fantastic real-life experience'. Our School covers 3,000 square miles and includes centres at Boston, Derby, Lincoln, Mansfield and Nottingham. As you can imagine, being able to link students in these locations with clinical practice settings across the region is an invaluable addition to their learning experience.

What are your future plans?

I have been talking to all sorts of groups in the Division of Nursing. There is a huge amount of enthusiasm and an increased appreciation for the potential uses of the system. I have talked to staff specialising in Learning Disabilities, for example, who are hoping to start a similar system. They have agreed to videoconference client-centred assessments, with the multi-disciplinary team present: client and carer, nurses, physiotherapists, occupational therapists

and doctors. This kind of experience would not be possible without the videoconferencing technology.

The potential applications in clinical practice training are immeasurable. Nurses who teach breastfeeding to students in practice are enthusiastic about it. In Mental Health, colleagues are interested in using the system to demonstrate to students in a classroom how to assess someone. Lecturers on 'Return to Nursing' courses can see the application too. There are many opportunities for using videoconferencing in this way. However, we do need to ensure the technology works: it needs to operate effectively at the remote site, and there are, quite rightly, restrictions in the Health Service on how much access can be given to outside agencies. So there is a lot of exciting work yet to do.

What are the learning and teaching benefits of the system?

I think an important factor is that, in contrast to watching a video, this is not

about just observing situations, it is about interacting with them. We are not simply 'gazing' at the patient - it is a two-way encounter. The students can ask questions that they couldn't ask in practice, and the service users can give their perspective on a particular matter that is important to them. In this way the students are learning from the patients' experiences and knowledge.

How do you envisage embedding use of the technology in teaching practice in your School?

It will be possible, but it will take time. People are still getting used to the idea, but there are so many applications in terms of module outcomes. Most modules need a patient perspective, for example, and this is an educationally sound way of providing this. The videoconferencing technology helps to link the theory to the practice. Most sessions in Nursing have a practical element, so this gives them more clinical exposure. The diabetes clinic, for example, is an example of good practice in group education. Not many students would be able to see this first hand, so the videoconferencing session increases capacity, and it also means that the students can ask questions immediately. Everything is live and interactive.

How do you measure the success of it?

What I am most pleased about is how willing patients are to take part in these developments.
One of the students at the diabetes clinic

> "There is a huge amount of enthusiasm and increased appreciation for the potential uses of the system"

asked the patients 'How did you feel about the fact that we were looking in?' Both patients and carers said that 'We forgot you were there'. And the patients are really pleased to answer questions. They say that they feel they are giving something back to the health service which has been helping them. The fact that the students recognise and value this 'real-life' access is in itself the best measure of success. Student comments: 'A really good way of learning - will enjoy doing this again - real life'; 'a respectful and ethical way of observed learning'; 'A valuable educational experience of real life', are all proof of the impact this is having on bringing learning to life. I now want to go on to conduct a larger evaluation study to determine the mechanisms that contribute to successful outcomes for a teaching and learning observatory in clinical practice.

Active learning through the Cultural Exchange:

Using videoconferencing to facilitate cross-cultural dialogue

Maryse Wright and Oranna Speicher

Maryse Wright is Head of the Language Centre. She leads on a project looking at evaluating and developing the curriculum for undergraduate language and non-language specialist students (French, German and Spanish) in their first year of post A Level studies in the School of Modern Languages and Cultures. Her area of expertise is post A Level French language teaching to non-specialist language students.

Oranna Speicher is the E-Learning Development Officer for the Language Centre, and also a German Language Teacher. She is currently leading three technology-based projects: **The One Stop Language Shop (OSLS)** *with Dr Thomas Koller;* **The Cultural Exchange** *with Maryse Wright;* **The Virtual Assistant** *with Sarah Wullink.*

Oranna Speicher and Maryse Wright discuss their experiences working with partners at the Universities of Braunschweig and Lyon, and the impact of their work on the student learning experience.

What is the Cultural Exchange?

The Cultural Exchange (CE) gives language students the opportunity to talk directly, through a videoconference link, to their peers in Braunschweig and Lyon. With the Braunschweig partners the format included formal presentations with question and answer sessions, and less directed sessions where the students took the lead. This was supported by a dedicated WebCT course which included both a German and an English discussion forum. With the Lyon partners, the format was a weekly two-hour session over one semester, divided into a one-hour whole group session followed by individual students from Nottingham and Lyon pairing up using a webcam. Students had to keep notes of what was covered in both hours, including the vocabulary they had learned. This was used to write a Cultural Exchange diary, which was offered as an alternative to the news report which usually forms part of the assessment at this level.

What are the benefits of the CE over a standard classroom teaching scenario?

Maryse: It's a much more authentic, active exercise. In class, there is always the teacher at the front, and the students expect them to know the answers. With the CE, the students know that they have to find the answers from each other. They might struggle, and they might have to ask lots of different questions and make lots of mistakes, but they get there in the end!

Oranna: I agree. The students were actively getting meaning both from their peers here but also in the other country, rather than asking us, which was great.

Maryse: It is quite amazing to observe because you think that nowadays, with all the opportunities for travel and so on, people are more aware of each other's cultures. But it is not necessarily the case. England, France and Germany are still so different. Students know in theory for example that there are words that look the same, that have the same dictionary translation, but that are used in a completely different way. Talking directly to their peers really highlighted these misunderstandings, these gaps between the two languages and cultures. It was a real learning experience.

What do the students get out of it?

Oranna: The students had to work together on the presentations. An outcome of this is clearly the development of good presentation skills and improved communication confidence. The interaction with the students in Braunschweig also improved the oral fluency and pronunciation of the Nottingham students, because they were exposed to a variety of accents. Success really depends not only on the language level of the students involved, but also on their personalities. Some students really don't worry too much about possible target language deficiency, they will just chat. Others are very concerned about accuracy and about making mistakes. You can't legislate for that.

Can you think about uses of this technology in other disciplines?

Maryse: It would be very useful for teachers in secondary schools. I am doing a project about transition in language learning from the 6th form to the first year at University. I think it would be a great idea to have a link showing students what happens at University and the other way round. It would be helpful if students doing first year language here, for example, could actually talk to sixth formers and say (because they have been through the system) 'this is what we do!'
Oranna: There are many departments that have exchange links with institutions abroad, like Law, Education and Engineering, for example. As long as you have the right equipment and the staff to support it, any sort of collaborative learning is possible with this arrangement.

A seminar in the Visual Learning Lab on Jubilee Campus, utilising the videoconferencing facilities

Can you tell me a bit more about the related 'Virtual Language Assistant' initiative?

Oranna: A lot of schools belonging to the University's widening participation consortium don't have the luxury of a language assistant. I worked with Sarah Wullink, the School of Modern Languages and Cultures (SMLC) Widening Participation Officer, to create a project with Ashfield School in North Nottinghamshire. We recruited an Austrian exchange student and introduced her virtually to the A2 group of five girls over in Ashfield. They then met every week for an hour for a conversation class - for each class, clear instructions were given to the Austrian student by the German teacher of the school. The German teacher at Ashfield stayed for the first meeting, but left them to it after that, just like it would have been had the Austrian student been physically present in the school.

How did the students over at Ashfield School react to the Virtual Language Assistant initiative?

Oranna: At the beginning they found it a bit bizarre! They thought it was odd, looking at someone through a screen but they quickly warmed to the idea. Sarah Wullink and I went over to Ashfield School and interviewed the students once the project had finished. As a finishing touch, the group invited the Austrian student to the school and they cooked some Austrian delicacies together. It was a really excellent end to it. We now have a French student who is going to go 'virtually' into another Nottinghamshire school and we are also carrying on with the Ashfield School and the German virtual assistant. It is all very exciting.

Learning through videoconferencing - The Student View

Name: Guy Johnston
Course: Mechanical Engineering with French

I took part in the Cultural Exchange during the first semester of last year. When I did my A-levels I did Maths, Physics and French. I liked all of them and wanted to carry them on. I think that a language is always useful to have. I might possibly want to work in France in the future, too. It was a good way to practise speaking French. I went to Toulouse last semester, so it was good to prepare for that. It was quite informal. We talked about current affairs, news, things like that. And we discussed the differences between the student experience in the two countries.

Name: Claire Arnold
Course: International Communications with German

It was really nice to do something a bit different. It really helps to be able to speak to and to see someone who actually speaks the language. It was quite novel and good fun. In addition to the more formal group presentations, we also did some free-for-all chatting about whatever came into our heads. I think this worked really well. When we had to speak on a specific topic, everyone was a bit scared to open up. But when we could talk about what we wanted to, it worked a lot better.

Name: Marie Jaeger
Course: Law

Excerpt from a Cultural Exchange Diary (originally written in French)
I've not only been able to practise my French but, and perhaps more importantly, I have learned a lot of things about another way of life, another culture and another country. What's more, I learned a lot of vocabulary. The Cultural Exchange was as good as a face-to-face conversation as it allowed us to learn spoken French during the webcam conversations, and more formal French during the presentations.

The technology used during the exchange was really important to the success of the project as it helped to create the necessary atmosphere for the learning of languages. The atmosphere in the one-on-one webcam sessions was relaxed and 'intimate' and allowed us to speak without feeling embarrassed. This contrasted to the atmosphere for the videoconferencing sessions where a more formal version of the (French or English) language was required.

"The Cultural Exchange was as good as a face-to-face conversation"

Podcasting, Vodcasting and the uses of Mobile Learning in Higher Education – An overview

Dr Rolf Wiesemes

The podcasting and vodcasting work discussed in this section reflects current University-wide developments in this area (illustrated by the ever-growing number of podcasts and vodcasts featured on the University of Nottingham's podcasting website at **http://communications.nottingham. ac.uk/podcasts.html**), and changes in global learning and teaching contexts.

University of Nottingham communications home page

This increase in the use of podcasting is also reflected in a rising number of academic papers on the topic. Lum (2006) for example, outlines the flexibility of use of podcasting, whilst Flanagan (2006) and Frydenberg (2006) describe specific uses of podcasting in Higher Education settings for large cohorts of students. Tynan et al (2006) focus on the use of podcasting for revision or as a backup for a traditional lecture format; and Lee et al (2007) have examined the benefits of podcasting for including distance learners more in courses. The initiatives discussed here from the
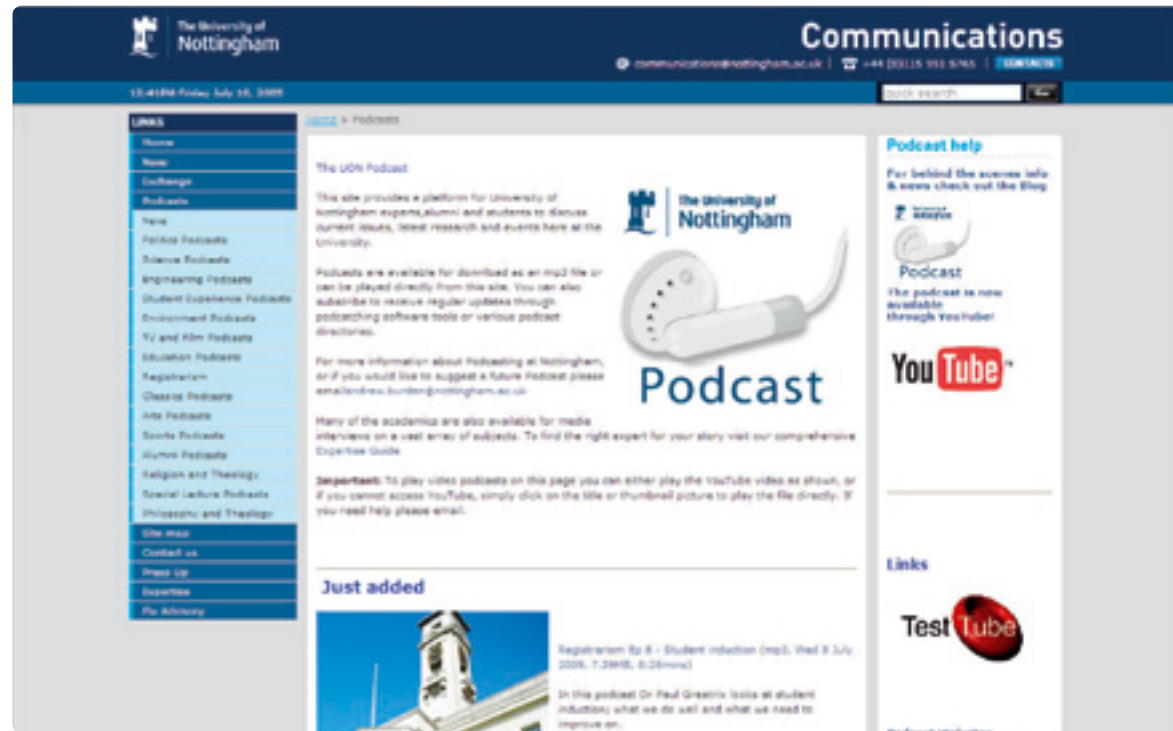
Department of Pathology and the School of Education reflect the variety of methods for producing pod- and vodcasts, and the uses to which these resources can be put. At the most general level, they can facilitate flexible and mobile learning. They can also provide additional resources, support and expand on subject content, and be quick and easy to produce.

In addition, the report from the Graduate School is indicative of a general trend towards combining a variety of mobile technologies (including vodcasting and podcasting) for

learning and teaching in both formal and informal settings.

In a recent Kaleidoscope report, Mike Sharples (Director of the Learning and Sciences Research Institute) reflects on how 'mobile technology can offer new opportunities for learning that extends beyond the traditional teacher-led classroom.' In this sense, mobile learning in general and pod- and vodcasting in particular constitute a challenge to purely teacher-led learning settings and offer a range of opportunities for flexible learning in formal and non-formal contexts.

Using videocasts and screencasts to teach laboratory techniques in Molecular Medical Sciences Dr Paddy Tighe and Dr Sally Chappell

Dr Paddy Tighe

Dr Tighe is Associate Professor in the Division of Immunology (Department of Molecular Medical Sciences) in Nottingham University Medical School. He teaches both undergraduate medical students and postgraduate Masters students and is a module convenor for several MSc modules. This includes a bioinformatics module which encourages the students to expand their computer skills though online assessments and use of a wide range of mixed media content. He has interests in on-line content delivery systems and learning environments suitable for distance learning.

What was the teaching and learning issue that this initiative sought to address?

We teach a Bioinformatics module. Bioinformatics is the use of mathematical sciences, statistics, and computing resources, along with biological data to try to get a better understanding of how a system works. Due to the nature of the course, there is a lot more supplementary material online than there is for other modules. Students learn how to 'mine' data to actually get the most out of it. The resources we want them to use are quite complex. We haven't got enough time in the module to teach them everything one-to-one, or in a group session. There were two main areas where we felt that new technology could make a significant impact: we wanted a way of showing them how to use the software so that they could get to grips with it; and we wanted to build up a video resource of lab techniques that they could refer to again and again.
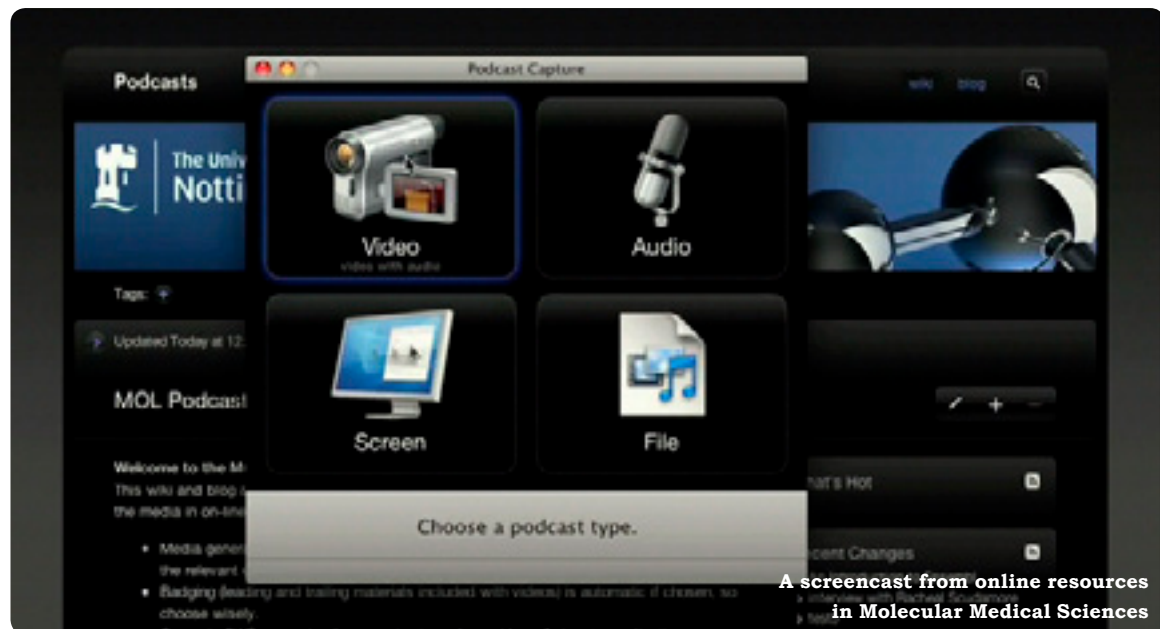
A screencast from online resources in Molecular Medical Sciences

Dr Sally Chappell

Sally Chappell is currently a lecturer and Course Director for the MSc in Molecular Diagnostics, which was launched in September 2006.
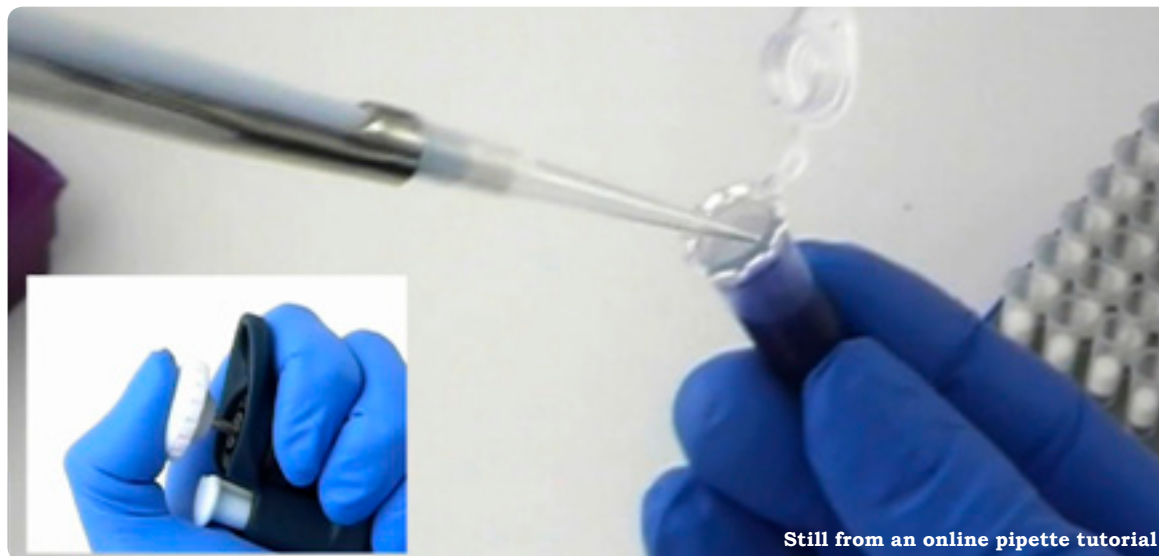
Still from an online pipette tutorial

What did you do?

We made tutorials which were recorded and visible to students as screencast movies - you have the mouse moving around on the screen so they can see exactly what they need to do at each stage.

For the lab-work element, we wanted to record some practical work which the students could access as reminders of methods and procedures in the lab. For a lot of students, the practical laboratory session is (time-wise) a little bit removed from when they have to do their projects. And of course, people forget! But we don't want to have to explain how to use the basic equipment over and over again. So what we did was to start recording footage in the lab.

How did that work in practice?

At the beginning we were using my old video camera to make the recordings. The new equipment allows us to do the job a lot more efficiently. We can now set it up in the lab and do it from the person's perspective. If you are trying to explain to someone how to do something, the best place to see it from is where I am seeing it from, and so we tend to record over the shoulder. Then we splice all the relevant bits together to make a movie and put a voiceover on it to explain what is going on in each shot. The software to do this is relatively easy stuff to learn.

We have started to build up some four to five-minute films. 'How to use a pipette' is a great example. We can cover all the essential dos and don'ts: This is how you use a pipette.

This is what you do with it, this is what you should *never* do with it, this is what you should expect it to work like, this is how you change the volumes.

The new server is 'blisteringly' quick! It is online. I can use it from my office, from the lecture room, from the lab. As long as I have a video camera and a computer together, I can do it. For the screencasts it is even more simple – I just need my laptop. The new equipment also lets us badge everything appropriately (i.e. insert titles showing when and where it was made, and other desired titular information), which is really useful.

What impact has it had on your teaching?

It is a great timesaver! Trying to render all your own movies takes time. But the new server has 8 processors. It renders videos in minutes rather than overnight. It is so easy to use. The footage from the lab is such a great resource for students. Getting that bird's eye view of how to do things is invaluable, and not actually something that ever happens in the 'live' situation. Students really value being able to refer back to it, and to reflect on it. We are just doing the bioinformatics modules now. It is interesting how many of the students say 'Oh, I have just done your tutorial'. They like it a lot. In the past we have had to say, look, here is the software. Here is a written explanation of how you might access this data on it. But in truth, nothing beats actually being shown how to do it by someone. So that is what these videos do. The screencasts don't cover everything about it, as we were encouraging them to see how things work. But if we give them this introduction, it gives them a good grounding - they say they don't feel daunted by the software. So we think it has saved us a lot of time, and it has certainly saved the students a lot of time and anguish.

still from an online pipette tutorial
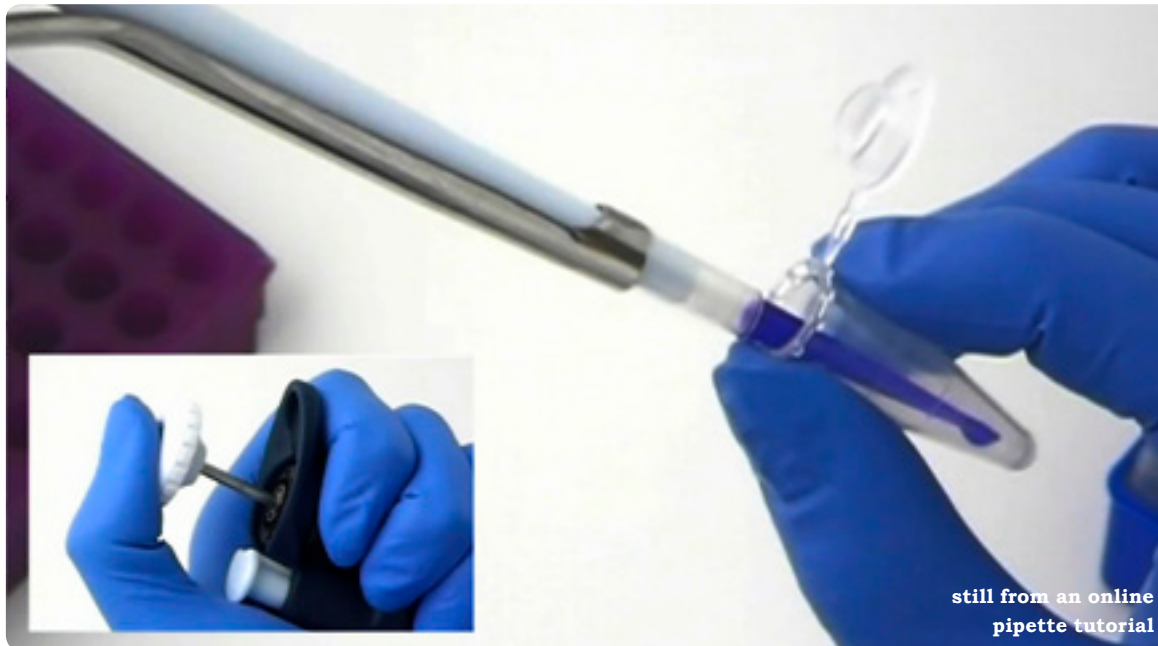
What about transferability?

Anyone could use this. We actually had some colleagues from Engineering who saw us talking about the system at a VLL Projects Day saying 'we would really like to use that!' All we need to do is to change the work flows to ensure that it badges correctly, and it is good to go. The set up is very slick and there is not much that you actually have to do yourself. Essentially, any discipline where practical, hands-on skills are necessary, or where complex web-based software is used, can benefit from having these online visual resources.

It sounds like it is quite embedded now in the Bioinformatics modules. Do you have any plans to use it for other modules?

We wanted it to work with the Bioinformatics module first, as it is potentially the one where it could have the biggest benefit. But we would very much like to have a lot more videos of practical immunology. It would be nice for the students to see these early on. For example, if they are reading a scientific paper but they haven't done that particular kind of lab work yet, by viewing the video material they will at least have an idea of what is involved. It always helps if you can visualise what someone might have been doing, to achieve a certain result. Now we have the new equipment there is no stopping us!

Podcasting and Vodcasting in Higher Education – Perspectives from the Cross-Disciplinary Research Group (CDRG)

Dr Rolf Wiesemes

Dr Rolf Wiesemes co-ordinates, supports and develops all VLL projects and capital VLL initiatives across the University of Nottingham in collaboration with the VLL core and management teams. Rolf's past and current research work focuses in particular on the use of video conferencing in schools and for teacher training and development through his work in the Teaching and Learning Observatory. As part of his role as Visual Learning Lab co-ordinator, Rolf is currently developing case studies of visual learning in theory and practice.

Rolf Wiesemes from the School of Education discusses ethical and practical factors in using podcasting in an HE context, and gives top tips for colleagues in other disciplines considering this approach.

What is podcasting?

Podcasting is the automatic transfer of audio files from a server to a client. It is being used increasingly in Higher Education as mobile learning gains popularity. Vodcasting is the video equivalent. In practical terms, this means that podcast users simply subscribe to these podcasts (like a magazine subscription) online, often via i-tunes, so that whenever you plug in your MP3/4 player your subscriptions are automatically updated.

What did you intend to do?

The Cross-Disciplinary Research Group (CDRG) seeks to promote and facilitate research dialogue across the disciplines and enhance research effectiveness by developing a support network of researchers across the University of Nottingham. Focusing on both the theory and practice of cross-disciplinary research (CDR) as well as practice issues, it seeks to broaden the notion of research skills training. This initiative set out to capture all CDRG talks as vodcasts and make them available to a wider audience.

What problems did you encounter and what have you learned?

Most speakers at CDRG events present original (and often unpublished) research data. This has highlighted some of the issues associated with the capture and subsequent broadcast of new research data which are important for future projects of this kind.

A lot of the work presented at the CDRG seminars by an individual researcher was produced as part of a larger research team effort. This raised the issue of who the owner of the work was and whether the work could be put into the public domain in the form of a pod- or vodcast at this stage of the research.

Initial preparation for the vodcasts was problematic: the quality of audio-recordings varied from one event to the next and it was not always possible to get copies of all the Powerpoint presentations used as part of individual CDRG talks.

Further processing of these talks has been problematic. It takes a long time to develop a process of preparing a vodcast that is not too time consuming for a non-technical member of staff, and which allows you to retain control of the preparation and editing process.

> "Ethical issues are important. Podcasters need to be aware of whether data can be made publicly accessible or not"

What were the learning and teaching outcomes?

Whilst the original aim of producing pod/vodcasts of all CDRG seminars was not achieved, this has been an extremely useful longitudinal process because it has resulted in the development of vodcasting preparation procedures, and an exploration of what is possible and realistic within a limited period of time.

Part of the outcome comprises a simple 5 step guide to the vod/podcasting preparation process, summing up the technical preparation for producing a pod/vodcast. This includes pre-recording and recording setup, turning a Powerpoint into jpeg files, converting and editing audio data for MP3 format, producing a film ready for vodcasting, and converting a film into a vodcast. Similar principles apply to producing audio-podcasts which might in some cases be more appropriate and accessible.

What are your future plans?

More advanced and more interactive ways of vodcasting are planned, reflected in further project funding awarded by the Centre for Integrative Learning. The project will explore new and innovative ways of preparing new teachers for the teaching of sensitive issues such as genocide, and specifically the Holocaust, in secondary schools through the production of monthly podcasts by a range of educational experts.

Do you have any top tips for academics in other disciplines considering making vodcasts or podcasts?

This work has shown that preparation is key and technical support is a necessity! Good quality podcasts need to be made in the right environments, and using the best equipment possible. It is also really important to consider ethical issues. Podcasters need to be aware of whether data can be made publicly accessible or not.

It is also important to devote sufficient time for post-production before publication of podcasts. It is unlikely that podcasts will simply be recorded and broadcast. A range of post production procedures (such as editing audio/visual, synching powerpoint slides to audio, producing transcripts, writing relevant webpage content, providing appropriate links) all take time, but are a crucial part of the process.

Podcasting for Graduate Students in the School of Education

Dr Richard Pemberton & Dr Jane Evison

Dr Richard Pemberton

Richard Pemberton is Associate Professor of TESOL in the School of Education at the University of Nottingham, where he teaches and supervises MA and PhD students. Previously he taught for nearly 15 years at Hong Kong University of Science and Technology, and before that at secondary and tertiary level in Papua New Guinea, Zimbabwe and the UK. One of his current research interests is an ongoing project that uses a Web 2.0 video discussion tool to promote reflection on teaching.

Second and Foreign Language Pedagogy (SFLP) Social networking site

A screen shot of the SFLP social networking site.

Abstract

TESOL Talk from Nottingham (TTFN) is an audiopodcasting initiative which aims to provide podcasts on topics relating to the MA TESOL (Teaching English to Speakers of Other Languages) programme taught at the University of Nottingham UK and Malaysia campuses. The podcasts, along with their transcripts, are freely available at **www.nottingham.ac.uk/TTFN.**

What did you do

We set out to produce weekly podcasts involving a range of formats (conversations, panel discussions, interviews, student discussions, guest speakers, debates) and to explore how podcasting could support student learning on our face-to-face MA TESOL programme. We made a range of podcasts including:

- Applied Linguistics: What is it?;
- Teaching and research: Where are the connections?;
- Plagiarism: What is the cause?;
- Communicative competence - can we teach it?

We are continuing to make podcasts as part of a project designed to help students think critically about TESOL-related theory and research. Further funding for this project has been secured from the Centre for Integrative Learning (HEFCE funded CETL).

Each podcast is introduced by a short blurb with links to relevant articles.A transcription of the audio is also provided. The majority of the podcasts are conversations around academic articles, although we have also discussed personal learning experiences and general language learning issues too. In most cases, the speakers are just us but there are occasional guests. Some podcasts produced in the first year of the project were recycled in the second year, and new ones were added.

What kind of issues did you encounter?

Three out of the sixteen podcasts we made have not been made publicly available. These were instances where student guests were talking about important cultural events in their

own countries. Although these podcasts were published shortly after they were recorded, the students only agreed to make them available to colleagues on their course, and not to the world at large. At the time, the site was password protected, but because it is now open access they have been removed.

Dr Jane Evison

Jane Evison lectures in TESOL at the University of Nottingham in the UK, and at the University of Nottingham in Malaysia. Her teaching interests centre on classroom discourse, pragmatics and grammar, and she has contributed both to the development of the Cambridge Grammar of English and to recent corpus-based English language teaching materials. Jane is also interested in the role that podcast and video technology can play in teacher education.

What were the learning and teaching outcomes?

We have also been investigating how the podcasts are received by students, and the particular nature of podcast discourse: podcasting is a very new genre, and as yet there has been little research into the nature of the discourse, particularly unscripted 'academic conversations'. We have a useful corpus of transcribed podcasts which can be analysed in a number of different ways. Analysis of the data (collected variously through open-ended questionnaires and focus groups) suggests that the students found the podcasts stimulating and valued the extra input that they provided. The podcasts have proved to be useful learning tools across a range of modules. Listening to particular podcasts and discussing their content forms part of out-of-class 'learning circle' activities across all the core modules on our programme. Other podcasts are recommended as optional, follow-up activities. We are continuing to work on ways to improve the integration of podcasts into our teaching.

What lessons have you learned?

There were a number challenges that had to be faced. The password protection that was used in the first year proved problematic and prevented some students, particularly those in Malaysia, from accessing the site. Therefore, in the second year we decided to give global access and to obtain a memorable url: **http://www.nottingham.ac.uk/ttfn**. Technical issues arose relating to dealing with the interface between our site and the University site's storage of podcast data, and with the uploading of the podcasts and their associated blurbs and links. These were solved by enlisting the assistance of a Learning Sciences Research Institute(LSRI) PhD student, who took on the duties of uploading, editing and site maintenance, leaving us with more time to work on content and integration. Finding ways to encourage students to listen to podcasts, rather than requiring them to, remains a challenge. We now provide a link to our podcasts from the Second and Foreign Language Pedagogy (SFLP) website, which gives another point of entry to the podcast website.

"The podcasts have proved to be useful learning tools across a range of modules. Listening to particular podcasts and discussing their content forms part of out-of-class 'learning circle' activities across all the core modules on our programme"

Exploring the effects of portable visual learning technology on the experience of learning in the Graduate School

What was the learning and teaching issue that this initiative sought to address?

The aim of this initiative was to give immediate access to mobile visual technologies for regionally-based part-time doctoral students in the School of Nursing, Midwifery & Physiotherapy and at the same time explore the presumed benefits of mobile visual learning for these and other postgraduate groups. We used HTC TyTN PDA Pocket PC Mobile Phones, chargers and SIM cards.

What did the students do?

In the initial face-to-face introduction to the device, it was modelled as giving students mobile access to the Internet, PDF files, video streams to support their learning about research methodology, as well as their substantive fields. It was further suggested to users that the equipment could be used to gather visual (and audio) data and as a tool for reflection in research. Blogging and journal streams with visual prompts (recorded by staff using the TyTN) were created for this purpose in WebCT. There was a range of overlapping expectations about how the device would

Dr Cathy Gibbons

Dr Cathy Gibbons is a Researcher Development Manager for the Graduate School of the University of Nottingham. She has an enduring, if rocky, relationship with the use of technology in education!

be used, which included: distance work; research; mobile working; mobile storage; PC programmes; keeping notes about research; accessing and responding to emails.

The students were asked to reflect on an aspect of their research and use the device to share that with the others. One student did a reflection on the ethics of her research. She put together a combination of face-to-face material and PowerPoint slides. She had never done it before, so it was new learning for her. For at least half of them, the sense of using a tool in this way was new. The acid test was whether any of the students would actually have one! For one lecturer, part of the reason she had become involved, was that in her University, lecturers were going to be given one. She felt scared and unprepared so this was a chance to get to grips with it. She felt her level of confidence improved to the extent that she was even able to help colleagues in her institution in their first forays into using the device as a research and work tool.

What were the learning and teaching outcomes?

In Nursing, everyday ward practice increasingly involves extensive use of technology, yet the change of context with this project left some of the students feeling deskilled. They all reached a point in the process where they actively reminded themselves that they have these skills, and had the confidence to be able to deploy technologies in new contexts. Most of the participant-learning was around the incorporation of technology into current behaviours: handling new technology with greater confidence; being exposed to new ways of incorporating visual technologies into work lives and actively engaging in this. The combination of the device with the support of WebCT (WebCT discussion forum posts were higher than expected), offers powerful possibilities for developing group learning. The initiative is seen by the Graduate School as effectively laying the foundations for the success of future work using complex interactive technologies to enhance the postgraduate student learning experience in Nottingham, Malaysia and China.

Visual Display Systems – An overview
Dr Brett Bligh

The central purpose of the initiatives described here is one of encouraging learners to understand complex concepts by creating, accessing, modifying and sharing visual representations and images. Innovative use of interactive whiteboards, online tools, interactive flipcharts, scanners and playstation games, all works to develop visual literacy amongst students, whilst at the same time, making complex concepts accessible and engaging.

The Thunder™ Wall, Hallward Library
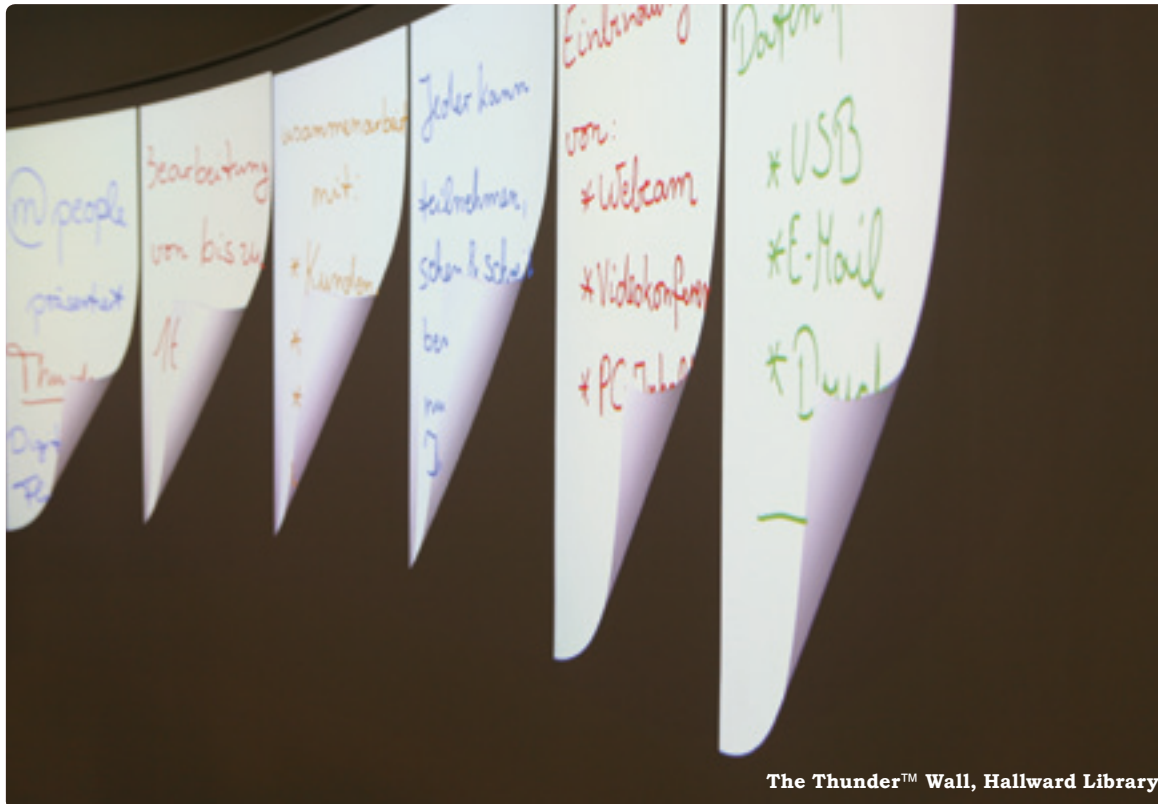
In Archaeology & Classics, posters are a key assessment tool. Katharina Lorenz's initiative has successfully integrated a range of visual technologies and resources to enable students to produce consistently higher quality work.

John Robinson from Engineering shows how increased interaction in the teaching of difficult concepts, through the use of an interactive whiteboard, has the potential to improve learning.

The work in Computer Sciences, described here by both Colin Higgins and Damian Schofield, reaffirms this need to motivate student interest towards key concepts if those students are to continue successfully within their studies.

Through the Assistive Technology Rooms in Hallward Library, students with visual impairment are provided with an environment which enables them to interact with computer based materials in ways more suited to their needs. Through tracking student usage of the space, it is possible to identify repeat visitors to the assistive technology room, showing that students find the room useful and are motivated to return.

Also in Hallward Library, the impact of the virtual flipchart system (Thunder™) on student involvement in seminars is being researched by Dr Brett Bligh in partnership with the School of History and the Department of Classics.

For each of these initiatives, a clear central purpose is achieved: to allow students to better understand, interact with, and communicate visually, using innovative and motivating visual representations and enabling technologies.

Developing Visual Literacy for studying and employment in the School of Humanities

Katharina Lorenz

Role: Associate Professor in Classical Studies, School of Humanities, Faculty of Arts

Research Interests: I am interested in the visual cultures of Greece and Rome, and my research focuses on the use and function of visual media as means of transmitting aesthetic or social information, ideologies and cultural knowledge. I am particularly concerned with exploring modern theoretical approaches to the media, visuality and perception, and how they can be adopted to the study of Greek and Roman art.

What was the teaching and learning challenge this initiative sought to address?

It is really about visual literacy. The things I teach rely very heavily on visual resources, and we didn't have the means to produce these types of resources in the Department. I had come from an institution where these resources were available to students and when I started here, I could see the difference between the Nottingham students and my previous students and their ability to deal with visual evidence.

Why do Archaeology and Classics students need visual literacy?

Our students go into a really wide variety of sectors when they graduate. The publishing sector, or even the education sector, value visual literacy as much as the museums or art historical sector. Whatever the students choose to do, it is always helpful to have these skills because we are such a visual society.

What did you purchase and how did you set it up?

Becoming familiar with the visual aspects

of the past is an essential part of studying Classics and Archaeology. The Showing Seeing Centre offers a stimulating environment in which to practice this. Housed in three rooms throughout the Archaeology and Classics Building on University Park Campus, it gives access to a wide range of tools to create, modify and assess visual material.

One of the rooms is a seminar group room where students can scan images and trial presentations on a large LCD screen. They can also play computer games. We have some Playstation equipment, for example, where students who are researching the representation of Classics in modern media

Student Poster (Elizabeth Harrison & Nicola Pearce, June 2007)

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can look at games like Civilisation and God of War. In another room, we have facilities for students to borrow laptops which have a wide range of state-of-the-art graphics software on them. They can also make use of our growing library of digital images.

Posters are routinely used by students for coursework assignments, and by staff to showcase their research throughout the Department and at conferences. The large format printer and scanner and associated high-end software we offer in the third project room means that the quality of the posters is now much higher.
The Bioarchaeology Lab with its low- and high-power microscopes provides facilities for teaching and learning in relation to the identification of archaeological remains (plant materials, animal bones and ceramics). These facilities allow us to teach key diagnostic features to larger groups of students across several compulsory and elected Undergraduate courses; and we can offer the imagery produced in these as identification packages on WebCT for learning and revision.

What are the learning and teaching outcomes that the technology helps facilitate?

In Archaeology and Classics, portfolios

are part of the mainstream assessment criteria and always have been. But now we can make them better quality. It has made a real difference. We have managed to get additional funding to employ MA student-tutors to run sessions at the beginning of modules explaining how to use the technology. There is still some way to go in terms of making students aware that there is a value in choosing to create your own image rather than simply downloading one from Google, but at least we have made a start!

What do the students get out of it?

I run a module on mythological images in the ancient world. It has 16 year-three students, and a presentation forms part of the assessment criteria. It was noticeable that in the first presentations the images were not particularly good and the students didn't focus on them in feedback sessions. But as the year went on, things changed. The peer-feedback during the presentations began to focus on the images, on whether people were using good or bad images, on the right backgrounds etc. I hope next semester that they will have gained expertise and will perform even better. I can see improvement already. It shows a real generation of knowledge and expertise developing, and a critical engagement with the images and their role in the presentations.

Are there ways the technology could be used by other disciplines?

We want to roll this out across the Faculty, and even the University, and build an image database for teaching and research.

A student using the facilities in the Bioarchaeology Lab

"This represents an opportunity for us to have an impact on the teaching culture in our disciplines, which is great"

It has also put us in the position on both a teaching level and a research level of being able to collaborate with people outside the University. For instance, I am attending an HEA Workshop in Warwick to talk about the Showing Seeing Centre. This represents an opportunity for us to have an impact on the teaching culture in our subject area, which is great.

What future plans do you have?

We are thinking in the future about collaborations with partners in other U21 institutions in the area of cultural heritage, technology and 3D documentation. And again, the facilities we have developed have put us in the position to do that.
Together with two colleagues in Art History, I am currently implementing new 3D modelling facilities and an image database for the whole faculty which is funded through a £150,000 grant from the Capital Investment Fund.

I have also started to do a collaborative project with colleagues at Humboldt-Universität in Berlin on different approaches to analysing images in German and British ancient art and classical archaeology and on how academics and professionals in each country deal with visual evidence. Having the financial support to innovate has helped shape these discussions. My hope in the longer term is that we will create students who develop expertise in these areas and become our graduate students. It is already working to a certain extent.

Students working in the Showing Seeing Centre

"We are thinking in the future about collaborations with partners in other Universitas21 institutions in the area of cultural heritage, technology and 3D documentation"

Relating theory to practice using interactive whiteboards:
An Engineering Case Study

What was the learning and teaching challenge that this initiative sought to address?

Undergraduates in our Department need to understand key (complex) concepts faced during experiments in order to progress in other core modules, and also for their professional lives after graduation: concepts such as vapour-liquid equilibria and psychrometry. The depth of learning in lab sessions is difficult to gauge, although the students are expected to engage and understand what they are doing.

We wished to develop interactive software to be used in situ in the lab, which would relate the theory fundamentals to the practical application in a visual context. The interaction would also allow the students to have feedback on their level of understanding, and therefore promote student-centred learning. The students would come to the lab, undergo training and evaluation using the visual system, and then move on to the actual lab exercise. The project would establish a novel learning interface for undergraduate students which would enhance interaction with difficult concepts faced during experiments.

What did you do and what were the outcomes?

We installed two separate Interactive Whiteboards (IWBs) in different laboratory-based scenarios:

1. Portable IWB

An interactive plasma screen was purchased and interactive software was developed from existing teaching materials used for the distillation topic for second year chemical engineering students. This software was adapted for use with the interactive plasma screen by allowing greater functionality from a finger-touch on the screen, using large on-screen operated 'buttons'.

A training session was held for postgraduate demonstrators to highlight the software and its relevance to the individual laboratory experiments.

Early indications suggest that the use of the portable IWB in the laboratories leads to an improvement in learning. The laboratory report scores of the students using the IWBs were compared with those in the previous cohort who carried out identical distillation experiments but did not use the IWB. Results increased from a combined average of 6.42/10 before the use of the IWB to a combined average of 7.65/10, using the same marking scheme.

2. Static IWB

An Activboard +2 was installed and has been successfully interfaced with laboratory hardware. The Interactive Whiteboard (IWB) projects a full-screen systematic image of a real-time chemical process which is located a few metres away. The equipment can be operated using a series of inputs directly from the IWB itself, and the response of the experiment is shown in graphical form on the IWB. Developments to the software and interface are currently being explored which will further enhance the interactive nature of the process.

The IWB-driven laboratory equipment is thought to be a first for chemical engineering education in the UK, and is already being used as a 'flagship' demonstration experiment for Open Days and interview days for prospective students.

> "Early indications suggest that the use of the portable IWB in the laboratories leads to an improvement in learning."

Dr John Robinson

Dr John Robinson is interested in the use of visual learning and novel forms of assessment within Chemical Engineering, and has research interests including novel separation and processing techniques using microwave technologies, and membrane separations with advanced materials.

A Research Case Study:
Using Thunder™ to increase student involvement in History seminars

Dr Brett Bligh discusses some of his research case studies into the use of interactive flipchart system Thunder™.

The Thunder™ system in the Dearing Education Building on Jubilee Campus

The Purpose

The purpose of the initiative was to determine whether student involvement in seminars could be improved by the use of planned, technology-supported scenarios, and to assess the quality of the interactions which were fostered as a result of the scenario designs.

The teaching and learning context

The School of History at the University of Nottingham has been taking strides to develop its educational technology base because this is seen as a mechanism for increasing student interest and improving involvement.

The technology

The Thunder™ system used as the basis for this research was originally developed for business use and appropriated for use in educational settings by the Visual Learning Lab (VLL). The purpose of the technology is to allow the display of many pieces of information simultaneously, using the concept of "flipchart pages" which are displayed by multiple projectors and controlled by a central easel. The Thunder™ system also replicates the easel interface on the tablet PCs (image to the left). This allows free-form interaction such as the writing of notes, drawing of diagrams and contribution of pictures to occur from the learners' seats.

The Process

A tutor from the School of History who did not consider herself technology-confident, was

introduced in a scaffolded way to Thunder™. A series of learning scenarios were developed jointly between the research team and the tutor, after which the tutor put each scenario into practice twice, with two parallel tutorial groups. We discussed scenarios which took into account both the needs of the module and the capabilities of the technology. Four seminar scenarios were eventually put into practice, across eight teaching sessions, two of which are discussed below (For an un-edited version of this research case study, including all four scenarios please see **http://www. nottingham.ac.uk/courses-office/thehub/ The_Hub_Spring09.pdf).**

At a glance: What is scaffolded learning:

In scaffolded learning, students are given the most assistance when they approach a new or demanding learning objective. As they increase in confidence and skill, the student receives less and less support so that gradually they assume ownership of the knowledge or skill associated with the learning objective for themselves.

Scenario one – 'asynchronous communication'

The first session was based around the notion of asynchronous small group communication. We introduced the Thunder™ client to the students, loaded onto the tablet PCs. Students were divided into three groups and asked to consider, within the groups, factors in the rise of Stalin. During this activity, of approximately 15 minutes, no conferring occurred between the groups. Within the groups, students either typed notes into a word processor, or drew them freehand using the tablet PC software. At the end of the activity, each group sent its notes to Thunder™ simultaneously. A plenary discussion was held, in which the tutor was able to identify the common threads in the students' work and to point out the differences in perception of the material that were apparent.

Students using the tablet PCs for small group work

Scenario two – 'synchronous communication'

The second session comprised two distinct tasks. The first task asked the students to draw non-mimetic representations of "liberal democracy", with Lissitzky's famous 1919 lithograph Beat the Whites with the Red Wedge as an inspiration. The second task, meanwhile, built upon the previous session and required student groups to consider the factors affecting the different pre-war outcomes for liberal democracy in Italy, Germany and France. This time, however, the group communication was synchronous, meaning that each group could see the work being undertaken by the other groups as it was happening, since the activity on the groups' tablet PCs was constantly projected on the wall.

Collage of student representations of liberal democracy

Evidence of success

Our results showed a gradual increase in confidence with the system, which seemed to echo the inevitable increase in familiarity between members of the student group, and between students and the tutor. The group-work exercises worked quite well; students were able to discuss topics in depth during the breakout sessions and contributed significant sets of notes to the plenary discussions. Some student groups typed bullet-pointed notes into a word processor, while others chose to draw diagrams and hand write and utilised more colours in their presentation. Perhaps the aspect of these sessions which most confounded our expectations was that student behaviour in the two scenarios seems to be very similar. Video evidence seems to indicate that this might be because student attention, during the synchronous sessions, was directed inwards within the group, rather than outward at the multiple projected screens where the construction of work was being displayed.

The exercise involving the drawing of abstract diagrams by students proved controversial. At the beginning of the session, many of the students did not see the relevance of the exercise. After some persuasion by the tutor, students were persuaded to have a go. A few attempted artistic renditions of liberal democracy, while others utilised formulaic representations such as ballot papers. The ensuing discussion, however, proved to be a rich discourse about what constituted liberal democracy and what assumptions underpinned it, with some of the more stereotyped representations drawing considerable critical attention. Ultimately, the exercise was seen to have been valuable by the tutor despite the divided opinion among the students!

Outcomes

The most tangible direct outcome of the project was that the History tutor, Carole Mallia, was recognised for her innovative seminars by being presented with a University of Nottingham Postgraduate Teaching Assistant Award. After accepting the Award, Carole reflected on the aims of the initiative: "Working with Brett and the VLL team certainly helped me gain confidence in using unfamiliar technology, and has made my approach to learning and teaching more open and confident. Feedback from students was particularly positive in the potential for using the Thunder in seminar teaching, as well as for their own study and preparation. The fact that students were spending more time thinking and responding to others in seminars, rather than taking notes, seems to have been one of the most beneficial aspects for them, and was my main aim for participating".

Carole Mallia receives the Postgraduate Teaching Assistant Award from David Burns (Director of Training & Staff Development at SEDU), and Tessa Payne (Head of the Graduate School)

Transferability

While this work was based in History, it must be emphasised that the theories we used – of student involvement and the integration of technology, space and learners – were developed to influence the design of teaching and learning scenarios in a very general sense. Many theories of learning interactions are equally transferable. Our only pre-requisites for this project were interesting visual representations, and a willingness by tutors and students to engage with new technology-supported methods, which would inevitably have an impact on their classroom practice. In theory, this is applicable to a range of other subject areas. In practice, we are already undertaking similar sets of activities in conjunction with the Department of Classics and with the MA course ICT in Education.

Visual Learning Aids for Computer Graphics

Dr Damian Schofield discusses his attempt to enliven the subject of computer graphics to increase student engagement.

What was the learning and teaching challenge that this initiative sought to address?

When I took over the Computer Graphics module within the School of Computer Science, it was a pure theory course focusing on two-dimensional graphical concepts. This is fundamental for computer scientists. However, I wanted to increase student enthusiasm for the topic by pioneering a more 'hands-on' approach. I wanted to retain student interest in computer graphics by providing more interesting alternatives to heavy theory textbooks.

What did you do?

First of all, it was necessary to determine those factors which could be varied within the software to give a better understanding of the theory taught. To this end, an underlying software architecture was developed to allow the students to interact with visual objects and alter the variables selected, based on the theoretical concepts taught in class (colourspace conversions, matrix transformations or resolution parameters, for example).

The next step was to develop the content for the environments which would allow the students to perform this interaction. Some of the supporting media was already available online to the students as passive web resources. A range of interaction functions was developed, using different interaction metaphors to allow the students to interact freely with the objects.

Finally, a mechanism was added for collating data on student use of the system, to allow for the evaluation of the effect of our software on student performance, understanding of theory, and particularly, student enthusiasm.

What were the learning and teaching outcomes?

The visual learning applications are designed to teach the undergraduates about two topics; two-dimensional transformation, and vision as it relates to the anatomy of the eye. Work has been completed on two types of learning object which cover these topics:

- On-line "mini-lectures", which talk the user through a particular topic while highlighting relevant information on adapted lecture slides.

A representation of the Nottingham Tram using computer graphics

- On-line "interactive learning tools", which begin by informing the users about a subject, go on to give examples, let the users experiment with changing variables while witnessing the effects, and finally test the user's knowledge with some multiple choice exercises.

Dr Schofield now works at the University of Adelaide. This article was compiled by Dr Brett Bligh.

Helping computer scientists learn the basics of programming through an interactive visual online environment

Dr Colin Higgins and Dr Ben Moss discuss their innovative work which involved visual representations of the impact of computer algorithms to help students learn troublesome concepts.

What was the teaching and learning issue this work sought to address?

All undergraduate students must have a grounding in programming if they are to effectively progress to subsequent stages of their degree. However, first-year Computer Science undergraduates studying the core programming module find certain concepts difficult to learn. We wanted to help students learn by providing a functional, interactive visual online environment where students can modify visual representations of the difficult algorithms and see the implications of their actions.

What did you do?

This work was conducted in three phases. First, we analysed our existing course data to determine the most difficult concept priorities. We then customised an existing system (the Jeliot system) to integrate with the module requirements. We also developed the software wizard to enable practitioners to create instances of the customized Jeliot system for specific code examples without requiring additional technical knowledge. The final stage was to develop an on-line lesson. This lesson addressed one of the problems found by analysis of our course data, using visual examples provided by the customised Jeliot system, and was developed using the software wizard.

What were the learning and teaching outcomes?

The wizard has been used to visualise a range of examples to complement existing teaching resources. These visualisations have been embedded into a Web-based lesson on the subject of arrays, covering the basic and intermediate concepts. The code examples have been carefully chosen to demonstrate the key concepts of arrays, whilst fully exploiting the use of visualisation for greater impact. The demonstration has been integrated with the existing Web-based teaching materials for the module.

Does this technology have a use in other disciplines?

Having developed a visualisation environment that could be integrated into existing teaching materials using the deployment wizard, what we have created is effectively the first of many such environments which could be used to teach a wide variety of programming concepts in Java, and thereafter a host of concepts in other programming languages.

Article complied by Dr Brett Bligh

Upgrade of Assistive Technology Resources for Visually Impaired Students in the Hallward Library

Rebecca Robinson, Disability Support Coordinator for Information Services, looks at the use of the new assistive technology facilities in the Hallward Library

What was the learning and teaching issue that this technology sought to address?

An assistive technology room (ATR) had previously existed in Hallward Library, but had become out-of-date and was not especially well used. During the development of the Learning Hub, an opportunity arose to allocate a new area as an assistive technology room (ATR) on Level 1.

The Visual Learning Lab (VLL) provided funding to allow the development of accessible, assistive technology for use by any student with a visual impairment.

Although this initiative concentrated on the purchase of equipment and furniture, it was also important to support the development of the ATR with in-house training for Information Services (IS) staff on general disability awareness and use of the assistive technology. The equipment was purchased early in 2008, and installed in the room over the summer in readiness for the start of the academic year. Further installations and/or changes have been made throughout the academic year as the room has evolved.

Have students enjoyed using the new facilities?

Usage has been monitored through the manual booking system and statistics show that there was an increasing number of 'new' students using the room throughout October and early November 2008. Later in the term, users started to make return visits. This indicates that users have found the room/equipment useful. Users tend to use the room for 2-3 hours each visit, although this increased to 4-5 hours towards the end of term.

This work has been a catalyst enabling IS to continue to improve the provision of assistive technology. Although the ATR is only in use by a relatively small number of students it appears to be a valuable resource for them, as repeat usage shows. Since the initiation of this project, further funding has been secured (from the Development Office and IS) to widen the provision. There is now an ATR in Djanogly Learning Resource Centre on the Jubilee Campus, along with a pilot provision at Sutton Bonington in the James Cameron Gifford Library. All of this has been based upon the innovative template in Hallward Library.

Beyond equipping the ATR, the funding has also enabled IS to be reactive to student requests, an example being a request for coloured overlays. These were purchased and made available for loan through the Lending Desk at Hallward Library. If successful, this provision may be rolled out to other libraries. Based on evaluation and feedback to date, the ATR in Hallward Library has been successful so far and is providing a good foundation on which to build future provision across the University.

"The Assisted Technology Room (ATR) in Hallward Library has been successful so far and is providing a good foundation on which to build future provision across the University"

Modelling and Simulation – An overview   Dr Brett Bligh

Mechanisms for visualising information, enabling simpler and more immediate representations of complex underlying data, are of interest to teachers and learners alike in Higher Education. The understanding of key concepts is an important pre-requisite if students are to develop their learning. Methods involving visualising, modelling and simulation, as evidenced by the initiatives described in this section, can help make these concepts accessible.

Whether a three-dimensional representation of the pelvis or views of proteins or plant nuclei at a microscopic level, the projects described here from Biosciences and Biomedical Sciences offer mechanisms to allow students to engage with complex imagery in ways which are flexible, adaptable and imaginative, and to have round-the-clock access to a growing bank of visual resources to refer to again and again.

Another thread shared by some of the initiatives within this section is the desire to generate a sense of gameplay as a component of the learning experience. Projects such as those described here from the Schools of Geography and Chemical & Environmental Engineering seek to encourage three-dimensional thinking about the effects of variables on the natural and industrial worlds. They tap in to the tendency of learners towards curiosity, experimentation and learning through experience.

The Geospatial Widgets project also clearly falls into this category, with curiosity built around the interpretation of plan views of geographical areas and the effects of rainfall. The Submersive Learning project, on the other hand, uses an emphasis on mine clearance and a series of tiered missions to frame an activity which is really about the development of teamwork and communication skills.

In both cases, however, the point is to demonstrate that, by the generation of student enthusiasm and engagement, it is possible to link a sense of fun and adventure with the achievement of appropriate learning objectives.

Images made using molecular modelling software by Dr Fergus Doherty
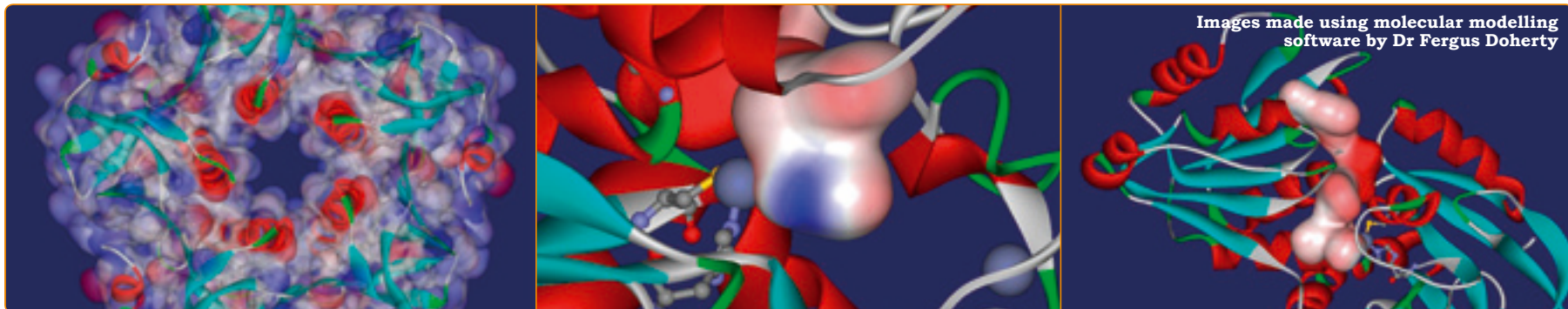
Understanding three dimensions – Biosciences has the Wow! factor

A protein modelled using the new molecular modelling software

Dr Fergus Doherty

Role: Lecturer in Biomedical Sciences
Specialises in: The use of Virtual Learning Environments in undergraduate education, in e-Learning, and Bioinformatics.
Research area: Biochemistry of ubiquitin and ubiquitin-like proteins.

What was the teaching and learning issue that the purchase of this technology sought to address?

We teach medical students and science students - biochemistry and neuro-science. Both these groups of students need some kind of understanding of three dimensions as applies to the life sciences. The technology we bought was designed to deepen this understanding through the production of various three-dimensional, and sometimes interactive, images.

Why is an understanding of three-dimensions so valuable to your students?

The medical students have to deal with the shape and structure of organs and skeletons. In text books these are always represented in two dimensions. They do dissections but they can only do these during timetabled class times so we wanted them to be able to look at a 3D representation of a bone in their own time.

We might have particular objectives that we want them to understand about this particular structure. The one we are doing at the moment is the pelvis. They have difficulty understanding the concept of the pelvic floor. So we are trying to facilitate this by using virtual reality to display the pelvis.

Images of a pelvis made using the turntable and camera

We put the structure on a turntable. The turntable rotates and a camera takes hundreds of images. These are digitally stitched together and it looks 3D. Then you can zoom in and rotate and really get a feel for how the structure works. This would be available for them to look at and investigate in their own time rather than having to be bound by timetables.

How do you visualise much smaller things, like molecules for example?

It is a very different process. The biochemists for example, are interested in the molecular level - we are looking at the 3D structure of molecules and proteins like DNA for example. Their function and what they do is tied up with their shape. You can't actually see these structures, so conventions have been developed of representing them that makes sense to humans. The software we purchased creates these representations based on data that has been collected experimentally.

Most methods involve crystallising the proteins, which are then bombarded with x-rays which are diffracted and scattered. The pattern is analysed by computers and it tells us where all the atoms are in space. The computer then renders that into an image. This works well for small molecules, but proteins are thousands of molecules. The software we have allows us to look at these representations for proteins as well as molecules.

We wanted students to understand the three dimensional nature of molecules better. We purchased software of the kind that is used in a research setting. It allows you to look at the structures and change them. So, say there was a mutation in the molecule, how would this change its 3D structure? These are all the things that a biochemist has to get an understanding of. You don't really get this from looking at a flat representation in the pages of a text book or on a slide displayed on a screen. On the computer, the students can rotate the molecule. They can zoom in on it, they can modify it and see what changes that makes. They can do various calculations. It brings it to life in a highly visual and interactive way.

How do the students view these images? You mentioned the Wow! Factor....

You can project these images onto a screen with stereoscopic projection. So you project two
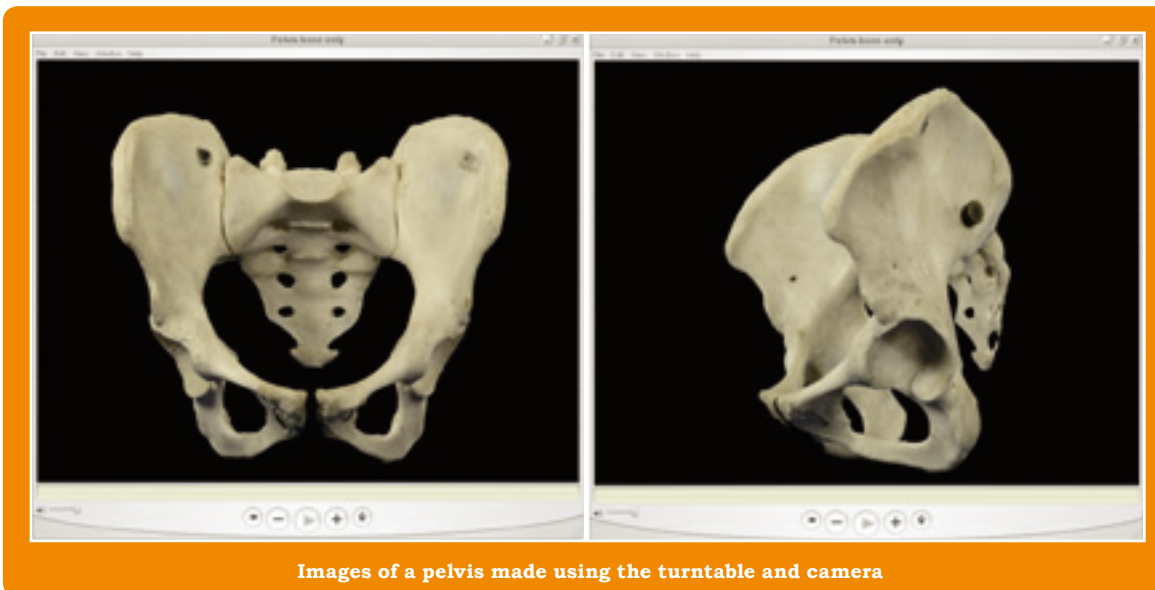
"I did find the virtual reality pelvis very useful. Being able to rotate it, provided me with a better understanding, as the pelvis could be seen in a 3D fashion when access to the dissecting room was not available." *Second-year medical student comments on the 3D pelvis*

images at slightly offset and watch it through special glasses. You really get a feel for the shape of it. You can't really examine it, or quantify it, but it just makes an impression. You can rotate it and manipulate it whilst it is being projected.

The students are impressed. It is a whizz-bang approach. The parents love it on Open Days! We are going to use it as part of a master class in March in partnership with the Widening Participation team: "The Molecules of Life in 3D". The visiting students will use the molecular graphics software to investigate protein structure for themselves and then we will use the stereo projector to view these molecules in stereoscopic 3D.

What do students get out of it?

The technology makes these structures real for them. We have a practical lab-based module where the students investigate proteins in various ways. As part of that, they spend a couple of weeks using this software in various ways, to make modifications and calculations, and we assess them on it. Often this is their first exposure to this sort of thing and they do find it hard! But sometimes it is going to be hard. Bioscience is a difficult area!

What can you envisage this technology facilitating in the future?

In the future, we would like to generate our

own 3D images of this protein – to actually collect the data so that we can get the students to crystallise a protein. We would then send it away for the x-ray analysis to be done - this process is very expensive and there are very few places in the country where it can be done. Once they get the data back they can visualise a protein that they crystallised themselves. And then you could say well, is it possible to generate different kinds of structure? We could crystallise it in slightly different shapes and then look at what difference this makes! We haven't done it before. It would be technically challenging, it might not work, but it would be really great even just to have a go at it. It would bring the bio-informatics (the use of the software) more tightly integrated with the students' actual hands-on labs work. It would be their own structure that they solve, not the one they got from someone else. We'll see!

Can this technology be used in other disciplines?

At the moment, the molecule modelling software is only really used in Biology, Bioscience and Pharmacy. But with the turntable set-up, you could put anything on there. Archaeologists could bring some of their artefacts down here and have a go! It would be a safe way for students to be allowed to investigate fragile archaeological artefacts that are not appropriate for handling in other ways. We would love that!

We are even thinking of trying to go down to

a much smaller scale. One of the biologists has asked me about chicken embryos. You could do them at different stages. It would be challenging as they are really small, but it is feasible.

It looks like you have come a long way, but I don't imagine it has all been plain sailing!

There was a long learning curve and there is still a long way to go. We have got a lot of stuff to do with the rig and the photographs for example. We want to make it more interactive. It's possible to create hotspots on the image, so you could click on the image and it would pop up a message telling you what that is, or even pop-up an image of a cross section through it at that point. The technology is there, now we just need the time to develop it!

Images of made using the molecular modelling software

Using a microscope with a digital camera facility to demonstrate cell structures in Plant and Crop Sciences

Dr Mike Davey

Students in the lab using the digital microscope and digital camera

Dr Mike Davey

Dr Davey is a Research Officer in the Plant and Crop Sciences Division at Sutton Bonington Campus. He has been involved in the culture of plant cells and tissues since 1967, and has been exploiting this technology to genetically manipulate plants by transformation and somatic hybridisation.

Overview

We installed a Nikon 50i microscope with a DSFi1 high resolution digital camera and large format monitor. It is an excellent teaching facility that delivers research-quality images. It is freely available for use by colleagues from other disciplines (e.g. Animal Sciences) who may wish to obtain images of living material and preserved specimens.

The instrumentation has been used extensively in the Academic Sessions 2007-08 and 2008-09 in the teaching of practical techniques on the plant genetic manipulation module, and also in the area of plant biotechnology.

There has been excellent feedback from students taking these modules. After the equipment was used to demonstrate cell structure to undergraduate students, five of the students opted to carry out their Final Year Projects in plant cell culture. The equipment is also exploited routinely to train PhD students and research visitors in cell structure and function. The fluorescence facility has been especially useful in investigations of cell multiplication and gene expression.

"This microscope has, and will continue to be, an excellent teaching facility, and the specimens that we have examined have certainly inspired some of our students to carry out their research projects in the laboratory"
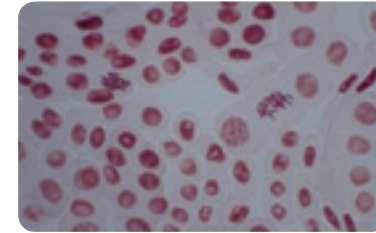
Nuclei and chromosomes in cells from an onion root tip

A germinating pollen grain of petunia
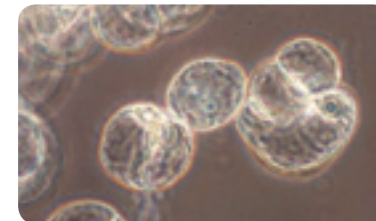
Cultured cells of petunia
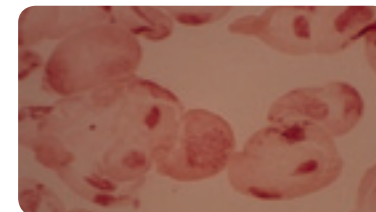
Chromosomes in cultured cells of petunia

Submersive Learning

Chemical Engineers take a ride on the (not so) wild side with 'Budgie' and get to grips with a Chemical Plant through a computer simulation

What were the learning and teaching issue that this capital award sought to address?

The most important aspect of the simulated chemical plant (VIRILE -see information box on page 46) was the idea of giving a problem to the students that doesn't just require 'turning valves' and 'following a recipe'. Chemical engineering kit, quite often, has a specific operational procedure which gives little scope for curiosity. Students run the experiment, collect the data, write up the data and hand it in. The criticism can be that the process is very 'samey'. If the experiment is particularly limited in flexibility, it may require students to do exactly the same as every other group has ever done in times passed. The experiments are useful and important for demonstrating engineering principles but they don't necessarily stretch them in all directions. So the challenge was to think of new ways of giving them problems that aren't necessarily straight forward and that require a bit more lateral or creative thought.

Did they enjoy the experience?

Yes. The feedback has always been positive. The software we have generated has been novel. They have never seen anything like it.

We have run it across different year groups as appropriate. Some of the things we do, like the full version of the virtual chemical plant, would be appropriate for 15 to 25 year olds. For example, with final year undergraduates, we would give them minimal information and they have to optimise the chemical plant using all the knowledge gained over 3 to 4 years of study. With secondary school children, we'd present a very narrowly-defined aspect of the chemical plant software to demonstrate how process engineering works and to explain what 'unit operations' are. Some of the games we have developed, on the other hand, are better for first and second years, although the fourth years enjoy playing them!

We are trying to convince our students at an early stage that there is a huge range of things that they will be looking at and will become interested in, so introducing it to the first years sets the tone.

"We just wanted to put them in an environment where they felt they were making important decisions, and communicating those decisions to their colleagues. The game itself is an irrelevance. It is all about the problem that you are posing them"

Dr Ed Lester

Research Interests:
Nanomaterials and supercritical fluids
Microwave technology and commercial applications
Combustion Technology

Expertise summary:
Ed started out as a Marine Chemist as an undergraduate before taking on a PhD in Chemical Engineering. Since then he has been busy working at the interface between chemistry and engineering. He is a member of the National Centre for Industrial Microwave Processing (NCIMP) and is Technical Director of a company called Promethean Particles that makes and sells nanomaterials using reactor technology that he developed whilst working in the Engineering Faculty at Nottingham.

What is Budgie, and what is its purpose?

Budgie is based on the popular and widely played Minesweeper game but with several unique twists. Firstly, the mine sweeping exercise is conducted in a 3D environment, promoting the use and development of 3D spatial skills. Secondly, the application is divided into two sections, an in-sub element, and a control room element. The user of the in-sub element is given a first-person view from within the sub and can control its movements in the 3D environment, while the control room element gives a 3D overview of the search environment itself. Contact between the two elements of the Widget is maintained visually and aurally through a dual webcam setup, although either aspect of this communication can be removed at any time by the system administrator. The Budgie Visual Lab Widget, as a result, also includes a large element of group interaction, team dynamics, and establishing effective means of communication within its basic minesweeping premise.

The game is easy to pick up but playing it well is really hard. The purpose is more important, which is about teaching students to think in groups, make decisions in groups, and communicate as a group.

Budgie - A team-building 3D environment based on minesweeper games

The control room application

Why is teamwork an important skill for chemical engineers?

It is important to everybody. But engineers generally work in teams. You generally end up working with some people that you get on with and some that you don't. So learning to make decisions and to be dynamic in a group where there are other equally dynamic (or less dynamic people) is an important skill to learn. We wanted to put the students in an environment where they had to make decisions, and communicate those decisions. The game itself is an irrelevance. It is all about the real problem that you are posing them.

Apart from developing team-building skills, what are the other outcomes?

You are giving them a challenge that they have never had before, so you asking them to develop a structured approach to solving a new problem. You are stretching them in different ways and getting them to think outside the box, think about things that are not specifically chemical engineering-related. You are teaching them about communication, leadership and decision making.

The most unique thing is putting them in a situation where there is a bit of pressure. You are simulating something that actually counts – where there are consequences. They are not recording data, or observing some engineering principle. With Budgie, they have a lot of freedom to experiment but they also want to get it right, and the net affect of not getting it right is that they 'lose' one of their colleagues. I think that is the most novel thing that we have done.

Can you think of contexts in which this technology could be used in different subject areas?

As I said, it is the purpose of this game which is important – developing teamwork skills. And this is a skill that all students need. Almost all of the games could be transferred to any other faculty. You don't have to be good at maths to understand even some of the more complicated elements of the games that we have. The Virtual chemical plant is most appropriate to engineers and to scientists. Chemists, for example, even though they wouldn't be involved with a chemical plant in the same way, would have an interest in seeing how it worked.

How are you able to measure the success of something like Budgie other than student feedback?

There has been a lot of interest across the University and outside the University. Most of the software is designed so that it is not geared up for a specific age group: most games are as much for five year olds as twenty-five year olds. It is the level of engagement that is different. My own children have tried out some of the software that we also run for undergraduates. What you expect of them is different but the game itself remains the same. Colleagues in other departments have asked to borrow Budgie to help their students develop some of the more generic communication skills. It might be, that in the future, we find a more central location, like the Hallward Library, to house it.

The VIRILE Plant Simulator

The ViRILE (Virtual Reality Interactive Learning Environment) simulator was developed to provide engineering students with access to 'real-world' large-scale processing equipment which they would not normally be able to experience as part of their studies. Virile, with its 3D polymerisation plant and extensively configurable processing simulation, provides an environment in which students can apply theoretical knowledge to 'real-world' engineering challenges and connect this knowledge and process-flow with the spatial context of a plant setting.

The Virile Polymerisation Plant application has been used in a number of ways. It has been used as the basis for experimentation conducted by Professor Claire O'Malley and colleagues in psychology investigating the use of 2D diagrams in enhancing the understanding of 3D relationships; it has been used within the Chemical Engineering curriculum as an assessed piece of work for undergraduate students; and it has been used with prospective University students as a practical demonstration of real-world processes and high-tech visual spatial teaching methodologies.

The ViRILE plant simulator

Diceeee

The Diceee Visual Lab Widget was designed to help students think about and develop spatial visualisation skills and spatial memory. Diceee involves a 3D rotating dice which can be viewed from all sides before each round. When the user is ready the numbers on the sides of the dice are removed and the dice rotated. The user then has to determine which side is facing the front. After a series of correct answers the difficulty of the game is increased by increasing the number of rotations and rotation speed.

Diceee is a web-delivered Visual Lab Widget which has the facility to record detailed online data logs of users' interaction with the application and the results they achieved. Diceee has been used with a range of students including those enrolled on an engineering summer school and widening-participation schemes held by the University of Nottingham.

The Diceeee game

Geospatial Widgets:

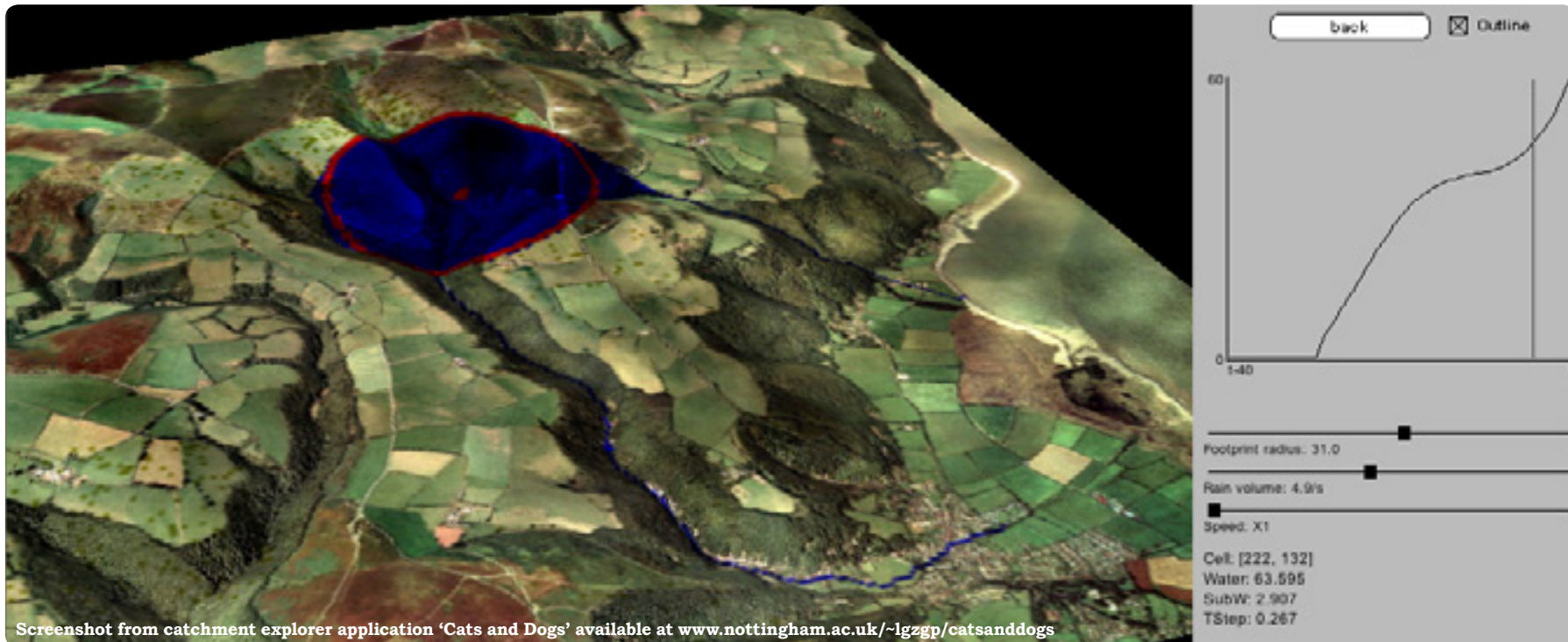## Using visual technology to describe multiple dimensions in the School of Geography

Description

The Geospatial Widgets project looked at various interactive learning objects designed to teach spatial and logic skills visually. The two discussed here are Catchment Explorer which allows the process of rainfall, river flow and flooding to be explored and visualised, and Learning to Read the Landscape, which explores the relationship between a 3D view and a corresponding plan view.

Dr Gary Priestnall

Gary is an Associate Professor within the Geographical Information Science research group of the School of Geography, at the University of Nottingham. Specific areas of interest are: Landscape Visualisation; Geographic Representation; Spatially Aware Computing; Feature extraction. His teaching interests lie mainly in the areas of geographic representation, visualisation and computer programming.

Screenshot from catchment explorer application 'Cats and Dogs' available at www.nottingham.ac.uk/~lgzgp/catsanddogs

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What was the learning and teaching challenge that this initiative sought to address?

We identified several gaps in the way that we taught certain subjects. Where the subject being taught is very complex and difficult to convey, interactive visual frameworks can really help. There were complex spatial relationships, and multiple dimensions to describe, and I was ending up waving my arms about a lot to try and explain something. It was difficult to get the information across!

There were parts of various modules where I could clearly identify the need for something a bit more interactive, something that students could take their time over, where if the problem-solving was supported by something more visually appealing they could come back to it again and again and it would complement my arm-waving.

What have you done so far?

I worked with programmer Jack March to develop five Shockwave 3D web-based game-like applications that cover geographical examples in modules ranging from programming to general geographical science modules.

Do the students get out of it what you had hoped they would?

They seem to, although the evidence for that is still anecdotal at this stage. The students use them more than I thought they would in modules. We can see this not only by watching them, but by looking at the high score tables. After the lecture and practical they are still coming back and using it, so clearly it is fulfilling a need in some way.

What kind of skills do the students develop?

The widgets are not stand-alone: they are embedded into modules. This means that it is very hard to isolate their particular impact. They are wrapped up in a blend of different teaching techniques and become part of three or four ways we are trying to communicate: arm waving, lecturing, papers and these games. They all contribute something different to the learning experience.

How could the outcomes be used by others?

These shockwave 3D interactive applications have been good at enabling different forms of

Screenshot from spatial skills test 'Locata' available at www.nottingham.ac.uk/~lgzgp/locata

spatial representation to be pulled together in quite a nice, engaging way. There is a lot of potential to explore spatial data in different disciplines. This project evolved form the lab-widgets project that Ed Lester started in School of Chemical, Environmental and Mechanical Engineering (see previous article). In a sense these two projects together are already demonstrating a good potential for transferability between disciplines. There is also potential there for computer science and the Centre for Geospatial Science to use the widgets as a teaching and learning and research tool.

Video-making – An overview

Sarah Kerr

In the current economic climate, ensuring that your time at University develops robust employability skills is crucial – showing that you can do more than sit and write essays might give you the edge. The two projects discussed here show that using video-making as part of the learning experience can both deliver on these employability skills, and also improve student achievement levels.

Michèle Clarke from the School of Geography and Gianluca Sergi from the Institute of Film and TV Studies have both integrated an assessed video-making element into some of their courses. Although the projects described below are very different, both staff share similar views on the benefits, and point to the demonstrable link between enjoyment and achievement: in each case the students involved put in an incredible amount of work and got not only personal reward in the form of a sense of achievement, but also in some cases reward in the form of higher marks.

Gianluca reports that the main learning curve is not the technology – which is now relatively simple at user-interface level.

Still from a student video submission

Do you believe that laboratory experiments can determine whether isolation weathering is effective in creating rock breakdown in deserts?

The main benefit is learning how to work with your peers in a constructive way to deliver something as a team. How do the students manage group dynamics knowing that their work is going to be assessed? How does it feel when your creative opinion does not prevail but you still have to put in the work? Both staff agree that the students enjoy the creative thought that the use of videomaking requires – Michèle reports that when her students graduate, the video-making experience is often what they look back on most fondly.

The fact that it develops the students' visual and technical literacy, and boosts their employability skills is an added bonus.

If these two articles inspire you to give it a go, there are video-making facilities on Kings Meadow Campus and Jubilee Campus which can be centrally booked. For more information, contact the Rich Media Group, a part of the IS Learning Team, either by email to simon.barnett@nottingham.ac.uk, or on 0115 84/67841.

Engaging learners through video-making in the School of Geography

Professor Michèle Clarke from the School of Geography discusses the teaching and learning benefits from the use of video-making as a form of assessment.

Professor Michèle Clarke

Michèle joined the University of Nottingham in 1998 and is currently Professor of Environmental Change. Her cross-disciplinary research interests include Quaternary environmental change, geomorphology and earth surface process dynamics, geochronology and biogeography. Her academic career reflects the multidisciplinary nature of her interests and she has worked in Schools of Chemistry & Molecular Sciences, Physics & Astronomy, Earth Sciences, Cultural & Community Studies and Geography.

What was the teaching and learning challenge that you sought to address?

I don't think the way we organise assessments is as engaging as it could be. If students are enjoying themselves, there are going to be all sorts of added benefits: they put more effort in than they would normally, and the output is great. My work was aimed at enhancing the potential of video-technology for helping students learn. We had some equipment on campus which allowed students to film their own videos, but you couldn't edit them. Students would use them, they'd have great fun using them, but the output would often be poor in comparison to the effort they had put into it.

Before we invested in this equipment, there was one student-access edit suite at the University, available through Information Services (IS). I found out about it through some students who had contacted IS and travelled over to Kings Meadow Campus (KMC). News of the facility travelled, and in the end the demand was such that IS contacted me and said 'we clearly have a need here, what can we do to help?' They were really supportive, but clearly with only one facility for a growing number of students it soon became clear that we reached capacity very easily. The students *loved* it.

The grant that I had from the Visual Learning Lab was for increasing the capital infrastructure to allow more facilities for students to do their own video-production. It has been very successful. Too successful in a way! Other Schools have come on board and now we are almost at capacity again: Nursing, Film & Television Studies and Chemistry have all engaged with video in slightly different contexts.

Why do you think video is a particularly good form of assessment?

Well, they have to think more carefully about how to present information. When you are presenting something visually,

Still from student video submission

"There is a benefit from doing this kind of thing on a personal level. It is rewarding to have your teaching appreciated and valued in this way. *And what is a University if it is not about teaching?*"

you are using different tools to get to your audience. The structure and design of how to share information and the visual processes around that are something that they haven't necessarily engaged with before, but are implicit in using this kind of assessment: It develops their visual and technical literacy. They like it because they feel they are being rewarded for the effort they have put in. I find that even when they get into the third year, they come back to me and say 'Can I have a copy of my video, cos I want to show it to my mates'. They are so proud of it! When they graduate, it is one of the things they remember doing from the entire course. It is different. If I could think of new and other ways to engage with that kind of creativity and enthusiasm, it would be great!

The good thing about video as a form of assessment is that you can see how much effort goes in. This means that if you are lazy,

Still from student video submission

it really shows! And the process of getting into groups and collaborating together develops a sense of peer competition. Once all the videos have been submitted, I book out a room and we all sit down together and watch them as a group. The students are very critical. 'That wasn't really very good because...'. And the ones they think are great they go 'Wow! Wasn't that great! I wish we had done that!' So they share their experiences in a way you would never get with an essay: It's real added value in all sorts of different ways. This is why I've been doing it for a number of years and, even with the timetabling problems and difficulties with accessing the facilities, I still pursue it.

Do the students appreciate the opportunity to develop these transferable skills?

Absolutely. After you have left University, how often do you write an essay? Critical thinking and writing skills are important, but the ability to be able to use video and think about presentation skills in a wider context is something that is transferable across all sorts of avenues and employment sectors. Receiving training on something that is professionally accredited gives them an extra point on their CV that they would not otherwise have. And I know they value it. The feedback shows that.

It is all about teamwork too and this helps them learn other employability and life skills: delegating responsibilities, diplomacy skills,

negotiating. They have to sort all these issues out as a group in order to succeed.

Apart from the fact that the facilities are once again at capacity, in what other ways can you gauge the impact and success of this VLL investment?

The quality of assessments I get improves every year, as students put more and more effort into it. I am getting submissions that are astoundingly professional in the way they have been produced. And this means that they do very well in the module. The implicit assumption is that I am being too generous with the marks, whereas actually what is happening is that the students are putting much more effort into it, and doing better as a result. I consider that to be a great indicator. of success.

Still from student video submission

It sounds like a huge investment of time and effort for you. Do you enjoy it?

I'm lucky as I'm in a School where teaching innovation is very well supported. Word goes round. I have my colleagues come down and say to me 'I've just had students raving about your course so I thought I would pass that on'. There is a huge benefit from doing this kind of thing on a personal level as it makes the teaching process so much fun, and so rewarding. And what is a University if it is not about teaching?

I do it because I love it! I enjoy the creativity. This is why I am currently going down a lecture-capture route. I have been awarded funding from the Capital Investment Fund (CIF) to take video a bit further. And I did that because I thought 'Wouldn't that be great?' So yes, on a personal level I get a lot out of it.

What have you learned and what future plans do you have?

What is really interesting about this is that it is really student-based, but no staff have yet engaged with it: there are no facilities for staff to do the training. I'd like to see staff involved. There are things we could do as academics with video-editing that could be really great. Staff-training would also allow us to understand the processes that our students are employing in a more comprehensive way.

We have also been talking about developing some e-learning training packages for students so that they don't have to go over to Kings Meadow Campus. They could learn online and then use the equipment here on University Park. I think there are some really exciting future developments that could grow out of this investment. So I would see where the project has got to so far as a first step on a path of increased use of different media in learning and assessment. Watch this space!

"The quality of assessments I get improves every year, as students put more and more effort into it. I am getting submissions that are astoundingly professional"

Selected stills from a range of student video submissions

Using practical film-making skills to enhance the understanding of theory in the Institute of Film and Television Studies

Dr Gianluca Sergi

Gianluca is currently researching Filmmaking practices, labour relations in Hollywood cinema, and film sound. In the future, he plans to focus mostly on researching contemporary cinema and television. He is currently working on a research project on the role of the movie guilds in Hollywood today. He also plans to continue exploring further the relationship between filmmaking practices and film theory, and the role of sound, extending to media other than film.

What was the learning and teaching issue that this work sought to address?

We teach film and television and there was a lack of any facility that might allow us to integrate practice with theory. Traditionally film has been divided into two categories; either you do theory or you do practice. But that is a false dichotomy really. There is no reason why you should choose. There is a 'third way', which is getting students to understand the theory by doing some practical work.

In other words rather than posing questions at the very beginning, we can let them get their hands dirty, and then, based on their own experience, they can look at what theoreticians and scholars have said and see whether there is any correlation.

This allows you to ask tough questions. So, for instance, people criticise Hollywood for making money and not art. When the students were engaging with making their film, were they thinking about how much it was going to cost or just trying to do the best they could? In other words, it is a way to get them to think about questions from a different perspective.
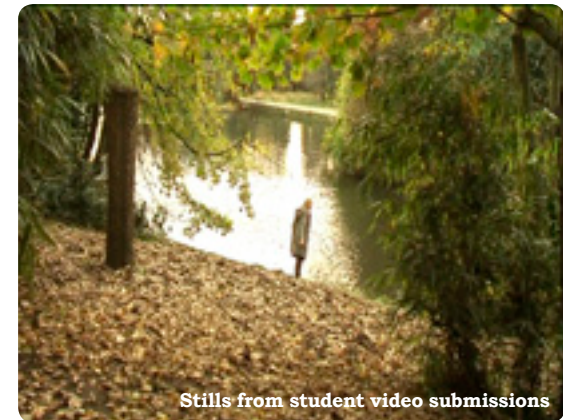
Stills from student video submissions

What skills do the students develop through this initiative?

Interestingly, the technical skills they develop are the least important, as they really only use a very small part of the capacity of the technology. Given that the course is primarily a theory course, we need to make sure that even the most technophobic person can do the work we require. What they do learn is how to translate problems into technological questions: I need to do this - what kind of technology can help me best? There might be more than one option. They learn how to identify the best tools at their disposal.

The primary skill they develop is how to work in a group. All of the modules using the technology involve group-work and this is obviously a great way to develop time management skills, and to learn about the allocation of responsibilities. They learn to come to terms with having to give something up to gain something bigger. They see the added value to 'we', and they get a buzz out of the energy generated by six people working to the same goal. They start off not liking it because everyone wants his or her opinion to prevail. But they begin to gain an understanding of what an incredible enterprise, in terms of communications, film-making is. You have all these people from different backgrounds, using different technical languages and somehow you have to get together and understand what the project is and then work to that brief.

Stills from student video submissions

What impact does groupwork have on assessment?

This is really interesting, as there is a clear correlation between group-work and higher marks. And this is a pleasant surprise for the students! At one stage, the mark differential between the group-work elements of the module and the rest seemed so stark that I actually asked the External Examiner to look at the whole module. He said that I needed to change the marks. He marked them up! So they ended up getting even better marks. There are problems with group-marking however, and being fair is difficult. But as a teacher, you have more time to assess group-work than you do with an individual assessment, so this is a plus too. All students say that they spend an inordinate amount of time working in groups when they are doing practicals. This is good and bad. You have to be careful that they then don't spend less time on their other work!

What are your future plans?

At the National Centre for Animation at Bournemouth University, they have developed a relationship between the different Schools and Departments based on projects. Students doing animation projects cannot do everything by themselves. When it comes to doing the sound element, for example, they can post something on a common board and say ' I need someone to do sound', and someone from Film will say 'I am looking for a project' - so you create those kinds of synergies, which is really good. We're not there yet, but it is something that we could look at in the future.

How can the technology you have add value to teaching and learning in other disciplines?

The Institute of Film and Television Studies is part of the School of American and Canadian Studies where several colleagues have an interest in topics that could benefit from practical film-making. A colleague who works on Slavery for example, uses paintings and literature to illustrate her research and teaching. She would like to see if film-making could provide different ways of using imagery and sound in her teaching. Colleagues in Literature have expressed an interest too, and there are other disciplines like Music where there are possibilities to interact. So clearly, the disciplines which could benefit from using this technology are many.

Stills from student video submissions

School-wide Visual Learning Initiatives - An Overview

Professor Roger Murphy

The very new School of Veterinary Medicine and Science (SVMS) has proved to be a very exciting environment within which to install and use a wide range of visual learning equipment. The staff in this innovative new school have readily grasped the potential that visual learning technologies have to enrich their courses. Within a very short period of time the School has built up some excellent visual resources to support teaching in a range of modules, and it is clear how video clips and some superb digital photographs can be used to bring concepts alive, and illustrate real world applications of veterinary practice.

Students using the new faclities in the School of Pharmacy

One of the great challenges in university-based professional preparation is reducing the size of the gap between a university teaching environment and the practical settings where professionals (such as vets) will carry out their work. Video conferencing and the use of pre-recorded video clips can both in very tangible ways bring professional contacts directly into the teaching room of a university. Alongside such applications ceiling visualisers and appropriately placed plasma screens can greatly assist with the visibility of intricate demonstrations of practical skills.

SVMS have been a fantastic partner for the VLL and the work we have done together has already been used as a launch pad for further exciting research and development projects, including a three year HEA funded study of learning from clinical placements, which is being conducted by the VLL/IRLTHE/SVMS and the Royal Veterinary College in London. This is one amongst several positive legacies arising from a highly productive period of partnership work between the VLL and SVMS.

Another school case study comes from the School of Pharmacy, which has worked closely with the VLL to make the most of visual technologies throughout their teaching spaces. Again, these developments have transformed the learning experience for pharmacy students, especially when conducting laboratory work. The VLL has worked closely with the School in developing and piloting a range of new visual technologies. The staff who have pioneered this work have shown great imagination in the way they have addressed a range of pedagogical challenges and have been very active in sharing the benefits of the changes with others.

The School of Veterinary Medicine and Science (SVMS)– a holistic visual learning approach
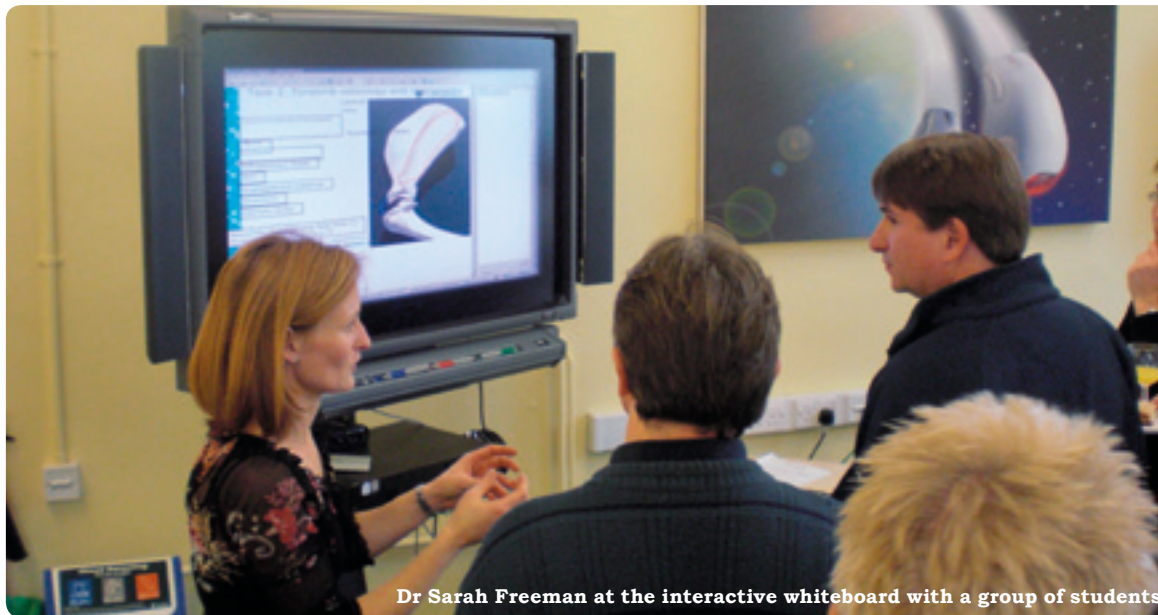
Dr Sarah Freeman at the interactive whiteboard with a group of students

The School of Veterinary Medicine and Science (SVMS) was given support by the VLL for ceiling visualisers, interactive whiteboards, videoconferencing systems and high-spec cameras.

SVMS-funded PhD student and VLL student intern Claire Mann talks to Dr Richard Hammond about the challenges in setting up SVMS, and about the role of technologies in supporting this very visual discipline. Dr Sarah Freeman and Dr Jonathan Huxley talk about their experiences of using the technologies with students.

Dr Richard Hammond

Richard is a specialist in the area of veterinary anaesthesia and an academic clinician teaching throughout the course at Nottingham. As well as having experience of clinical general veterinary practice, Richard has spent time working in the commercial operation of a major pharmaceutical company and as an academic educator at a number of other veterinary schools in the UK. Richard was awarded a Prize for outstanding contribution to teaching from the Royal Veterinary College in 2005 and fellowship of the Higher Education Academy for his work in curriculum design and integration.

Veterinary Medicine is an area where visual learning forms a key foundation to learning. Students need to develop many skills including understanding anatomy and structure in the context of the living animal, interpreting different imaging techniques and developing spatial orientation and dexterity skills for surgery. What is the impact on this inherently 'visual' discipline of cutting edge visual technologies? The SVMS experience shows that some technologies blend in easily whilst the real value of others only comes out when the students come to it independently. Some of it will grow in value as its functionality increases, and sometimes, the highest tech solution is not always the best one.

What were the challenges in setting up this new School and what part do visual technologies play in meeting them?

The challenges are probably not those that we had expected. We had thought that technical issues (Will the equipment work? Is it high-spec enough to deal with the amount and quality of data I need?) would have been the main challenge. In reality, the main issue has been about how to embed the visual technologies in the learning process. People sometimes have an assumption that they won't be able to use the technology. It is sometimes a case of "That would be a really good idea but I've never done this before therefore I'm not going to do it". A good example is the fact that although we have a bank of twenty four high-spec video-cameras (including the hi-definition video

camera), people actually prefer to use little video cameras where it is obviously just plug and play. The feeling is that there is nothing which could go wrong, and people are a lot more comfortable with that. Even though the quality may not be as good, it ends up adding a lot more to the learning because it is actually used. So sometimes the highest tech solution is not always the right solution – you need to know your audience and in a sense, meet them where they are at.

Another issue is time. We can capture really good quality video very easily. But getting that to an acceptable format to be delivered as learning, involves getting it from the camera to the editing suite, doing the editing, recording a voiceover etc. So in effect, the technology is not saving time, in fact it's creating more work! That doesn't mean it's not still adding value, but it highlights how much we underestimated the time taken to transform captured data into a useful learning and teaching resource.

Can you give me an example of where you feel it has added value?

For a practical session that I run on local anaesthetics I have a very nice set of 'video bites' - two minute clips produced by Pfizer in the US showing things like how to position a dog for an epidural, followed by a walkthrough of how to do an epidural. We have this running on the laptop next to the cadaver materials and equipment, supported by demonstration staff to show the students how to do it. The videos are available on WebCT, and this means the students can actually watch them beforehand and also

afterwards to revise and reflect on what they have learned.

The students like having these different formats. Some people are video-learners, some people are book-learners. Some people would be happy just looking at the static line drawing in a book. I am a very visual learner, for example, and a very 'do' person. If I am watching somebody on a video doing something, I want to get my hands dirty and give it a go. I think the video input can really motivate the students to want to have a go themselves.

What impact has the use of videoconferencing had on the teaching environment?

An example of where it has been really time-saving and added value has been in the training of our practice associates and staff

The portable videoconferencing kit

(in private practice who work in partnership with SVMS) to teach the students. This involves them doing a training course for nurse practitioners (how to treat students on rotation, how to assess them, looking at professionalism etc.) We will do the initial training face-to-face, but after that we will use multipoint videoconferencing. Multipoint videoconferencing is a system whereby a central 'hub' links various spokes. The spokes can all see the hub, but not each other. This system will be used to bring all the associates together. We will do it a bit like a game, having tasks where we've got one site playing against another site in teams.

Working with commercial veterinary practices is challenging because you can't ask them to down tools while you go in and train them on how to do assessments on students. But by using the videoconferencing set-up, we can make it more sociable – have a three hour evening session, with pizza at the end. They can all sit round and we do some activities to make sure it's interesting and engaging for them.

We have used videoconferencing in other contexts too. We have a small portable videoconferencing kit – it's the size of a textbook. All you need is a small box, the camera and you plug it into any screen, any monitor. So I've taken this elsewhere and used it. I simply phone IT and say I need to plug in at the School of Education, for example, and they give me a roving ip address. It's really easy. At the moment, however, even within the University, it's still seen as the exception rather than the rule.

The visualiser in use during a lab session

You have Interactive Whiteboards (IWBs) in most of your teaching rooms. Are they being used? Do they add value?

There are certainly places where the IWBs do add value. For example, during a recent clinical relevance session with a radiograph, the students had to highlight and label the structures they could see. Without prompting, one of the groups put the radiograph onto the interactive whiteboard and they were drawing onto it using the whiteboard pens, with different colours and tools. They obviously saw enough value in it to adopt that approach themselves.

What impact does the visualiser and big screen have on the learning process?

We realised at an early point in testing that having the highest possible quality colours (specifically the reds) was very important. The quality of image that we can project really is fantastic. And it's interesting, it

adds a lot of value to the teaching but it's also the single thing in the School which adds the Wow! factor when we are demonstrating what kind of things we do. It's amazing. You get vets who have been in practice for twenty years who come to look around and they love the School and they love what we are trying to do. When we take them to the lab and show them how you can show the detail from the front as part of the demonstration, their jaws are on the floor! They think it's brilliant. For our students it's the norm. For visitors it's incredible! There is much more value to live demonstration than in watching a video - the immediacy of somebody at the front showing it while the students are getting ready to do it is invaluable.

Do you have any comments on the overall impact of these technologies on the teaching and learning environment in SVMS?

I think one of the most important issues is that you can't force people to use technology, and clearly with all technology there will be early adopters, so in lots of cases, you need to show by example. We have to do more to help people see the value so that they adopt it for themselves. Going back to the clinical relevance session example, the fact that the students went to the whiteboard themselves, rather than being asked to, shows it is good.
I come from a perspective where if I can do something visually then I will do it. I look at the desired learning outcomes of sessions that I need to prepare, and ask whether there are visuals, photographs, videos available which I can use (from Pfizer for example) and if not, is there anything I can prepare myself to support the session? One new lecturer is developing a bank of video-bites on large animals (similar to an existing Pfizer session on small animals) using video capture from a practical so that we can use it year on year. New people coming in can see where we can add value, and this is a really useful motivator to develop it. Having the kit there and the people there is great, but the ideas have to come from them.

Views from the School:
Sarah Freeman is Clinical Associate Professor in the SVMS. She has been using the visualiser to demonstrate anatomy.

A current challenge within Veterinary and Medical education is how to deliver high quality interactive anatomy practicals to large numbers of students. The visualiser has enabled us to demonstrate aspects of anatomy such as neuroanatomy and joint aspiration, which could only be demonstrated previously to individual dissection tables using the actual specimen. The equipment is used extensively. We had our first intake of 100 students in 2006, and currently have both a Year 1 and a Year 2 cohort. Both years have extensive practical teaching – a minimum of 6 hours per week, much of which is based around anatomical dissections. The

Dr Sarah Freeman

Sarah Freeman joined the School of Veterinary Medicine and Science, University of Nottingham in 2005 She is an Associate Professor in Veterinary Surgery at the School of Veterinary Medicine and Science. She is a European Specialist in Large Animal Surgery, and also holds further qualifications in Equine Soft Tissue Surgery, Veterinary Anaesthesia and Radiology. She is a Fellow of the Higher Education Academy, and was awarded the Lord Dearing Award for Teaching and Learning in 2007 for her contribution to teaching and curriculum development. She is on the examination and accreditation committees for the European School of Veterinary Postgraduate Studies.

ceiling visualiser is used in every dissection practical (10 out of the 14 practicals during the first 7 week module).

The classes are structured with a key member of staff leading each practical session, and additional staff members facilitating smaller sub groups of the students. We have developed a system of guided dissection - the key member of staff provides the introduction to the class and demonstrates using prosections (professionally prepared specimens) which are projected through the ceiling visualiser. All students therefore have a similar experience and receive instruction from the most experienced staff member. The students then proceed with their own dissections under supervision of the facilitating staff.

The ceiling visualiser is left running throughout the practical, and any key questions and interesting aspects of the dissection can be demonstrated throughout the class. We also use the equipment to show any interesting features and good dissections from individual students, which helps them to become involved and take pride in their work. Students are encouraged to examine and use the prosections as references for their own dissection. Leaving the visualiser running throughout the class means that images will be projected whilst students are examining the prosections, which in turn encourages others to use them. The class is usually concluded by the key member of staff reviewing key points, demonstrating any areas of difficulties and illustrating differences between different species of animals.

The student feedback has been very positive, with real value being found in the way that visualisations can help students retain concepts learned in their practical sessions. One particular student found it helped her to 'learn a lot more than I would have done if I was just learning from lectures.' Another, who really enjoyed the sessions, felt that 'you can't understand something fully (such as a structure e.g. vessels, nerves etc) unless you have seen it in an animal'. She 'enjoyed the practical classes the most - I felt they helped me to understand the content of the lectures more and put what I have learned into context.'

Dr Jonathan Huxley

Jonathan Huxley is Clinical Associate Professor in SVMS. He has been particularly involved with the use of cameras to create an image bank in the School. He graduated from the Royal Veterinary College, London, in 1995 with the Royal Agricultural Society of England prize for farm animal studies and the centenary prize for second in order of merit in finals examinations. He is Clinical Associate Professor of Farm Animal Production Medicine and has responsibility for teaching farm animal studies.
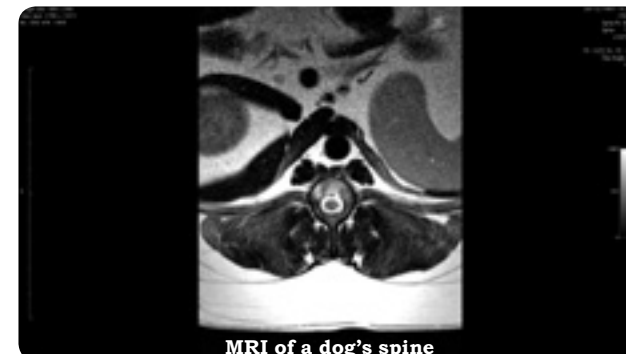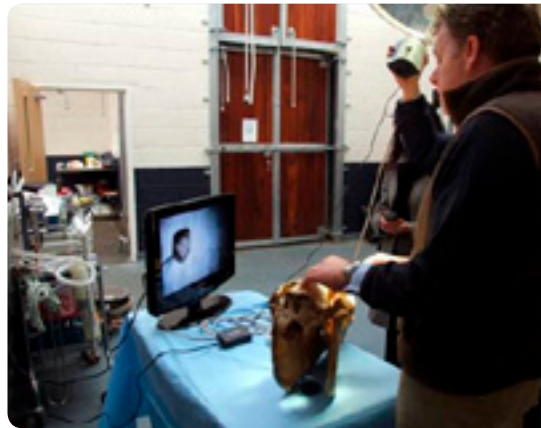
MRI of a dog's spine

The VLL Award has allowed the establishment of a camera bank within the School holding a range of camera types suitable for a wide range of image capture from still pictures of clinical material on farms to high quality video capture of techniques in carefully controlled environments. Over the same time period the School has established a 2 terabyte server with auto backup running Filemaker Pro with web publishing to store and log pictures and video footage. The school has also developed a formal relationship with the Royal Veterinary College, London allowing us to stream video off their streaming server. Images held within the database are freely and remotely accessible to all members of staff for integration in their teaching (see selection of images on this and the following page).

We have now established a relationship with one of the other UK Veterinary Schools to allow mutually beneficial sharing of material and avoiding duplication of effort. The production

Xray of a snake

The hand-held visualiser being used at the Oakham Veterinary Practice

Longhorn cow and calf.
Recognition and identification of domestic animal breeds is an important skill which veterinary undergraduates must acquire in the first few years of the course. Still cameras have allowed us to establish a bank of digital photographs

of further teaching videos is planned in the future; over the last 12 months staff time has proved rate limiting, however our staff numbers are increasing rapidly as funding for more posts becomes available freeing time for increased effort in this area. Our camera bank and the ability to produce this sort of material have also allowed us to secure external sponsorship from a large pharmaceutical company. They agreed to pay for the production of two training videos using a professional editing company.

From a personal point of view I really like being able to include both still and moving images into my teaching to illustrate key points and clinical presentation. This is especially true when the students can download them for future use. I think it is difficult to overestimate the value of the incorporating this sort of material into the teaching of what is a very visual subject.   The feedback from students making use of these cameras has been really positive. Sarah Potteron is a postgraduate student here in the School. She says that the use of the cameras has been "invaluable" in allowing the collection of photos which support her research

Using a versatile audio visual system to change how students learn in the School of Pharmacy

Dr Colin Melia and Dr Matt Boyd from the School of Pharmacy discuss the impact of new AV equipment on their laboratory and seminar work

Dr Colin Melia

Dr Colin Melia is associate professor in the School of Pharmacy, whose teaching and research speciality is the design, formulation and manufacturing of pharmaceutical medicines. His research into novel controlled release dosage forms and their mechanisms of drug release, is aimed at the need to develop new therapeutic approaches through improved drug delivery systems. He works closely with the pharmaceutical industry and acts as a consultant worldwide.

Students using the new facilities in the School of Pharmacy

What was the learning and teaching issue that this technology sought to address?

We wanted to maximize the impact of live demonstrations and ensure that each student in the lab enjoyed the same quality of experience. We also wanted to enhance our small-group teaching facilities.

What did you do?

A 50 student capacity laboratory was fitted with a versatile AV system. This comprises a 77" Smartboard™, linked with a sound system, a ceiling camera, a bench camera and a number of high quality 40" LCD screens distributed around the laboratory. In addition 3 seminar rooms were fitted out with 77" Smartboards™ for small group teaching. We spent considerable time planning how to configure these systems in order to ensure our AV elements worked well together. We wished to provide a system which was sufficiently versatile to encompass our current classes, future expansion, and different teaching styles. For the lab we wanted to ensure ease of use by staff, optimal student viewing and anticipated future uses of the lab. This proved a very worthwhile exercise, as it allowed us to anticipate problems and consider in depth, both the current and future use of the system, prior to its installation.

Can you tell me how the laboratory system works and what you use it for?

The lab is used extensively for both first-year classes in Practical Dispensing and the Science of Medicines Manufacture and third-year Chemistry lab classes. The technology was used to demonstrate visually the practical techniques used in the manufacture of 8 major types of medicinal product. Students then had to prepare the medicines themselves from a prescription provided. We used it for small group tutorials too, to explain how to analyse experimental results,

The use of plasma screens in laboratories in the School of Pharmacy

Dr Matthew Boyd

Matthew Boyd has been a Lecturer in Pharmacy Practice in the School of Pharmacy since August 2006. His research focuses on the use of Information Technology in healthcare and healthcare education. In the two and a half years in post, Matthew has been a keen advocate of the use of technology to enhance student learning and in 2009 was awarded the University of Nottingham Lord Dearing Award for teaching and learning, the highest award for teaching excellence in the institution.

"The equipment purchased through the VLL has been instrumental in triggering an extended programme of investment in teaching technology within the School"

and we also used the LCD screens to display instructions to students.

The system has proved remarkably easy to use. It is controlled by simple push buttons mounted on a single panel on the bench. These allow the academic to switch views, bring in each camera or the web from either the installed PC, or any laptop an academic might bring into the lab.

What were the learning and teaching outcomes of this installation?

There were improvements in all sorts of areas. Students were surprisingly focused and confident about the unfamiliar task they had to undertake - most clearly felt they knew what they were doing. The students seemed engaged with the demonstration on the screen and talked little - staff ascribed this to the effectiveness of the AV demonstrations in conjunction with changes in our system of marking. Interventions by the demonstrating staff reinforced rather than introduced learning. As a result of all of the above, students finished the exercises early and made few errors that would be dangerous to themselves, or to the patient.

Other changes that were clearly beneficial to the learning experience included the fact that for the first time, students were able to stay in their places during demonstrations. No-one fainted through having to stand and peer, as they had done in previous years. It has accelerated their training and given them more confidence, and it has provided a piece of jigsaw that has connected the theory that we give them in lectures, with the practical lab work.
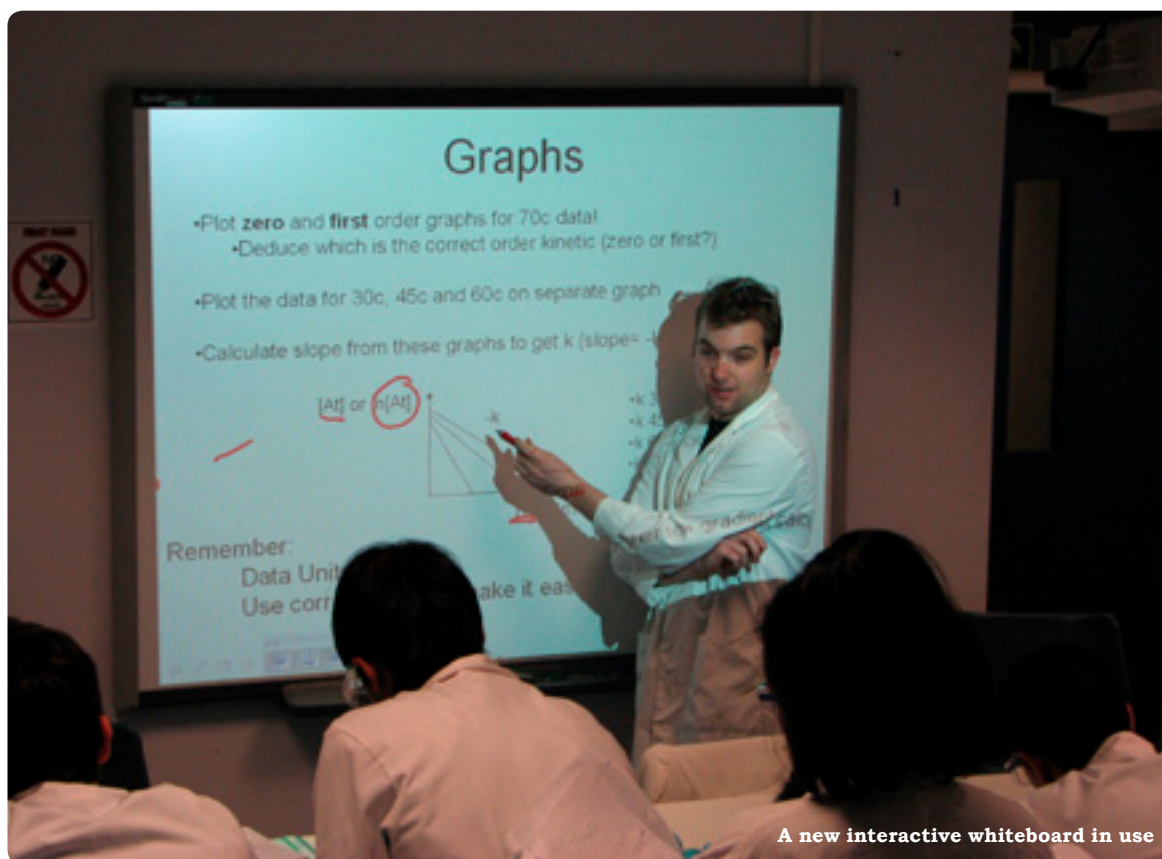
A new interactive whiteboard in use

"It has accelerated their training and given them more confidence, and it has provided a piece of jigsaw that has connected the theory that we give them in lectures, with the practical lab work"

A really good example of where the technology has clearly worked is in a demonstration of how to accurately weigh powder. The pharmacist is ultimately responsible for the quality, safety and efficacy of the medicine on the ward, so accuracy is a crucial skill. Quality (precision, cleanliness and reproduceability) and efficacy (if you don't make it right it doesn't work) are the key skills of the pharmacist. We have been able to use the equipment to demonstrate a little pharmaceutical trick of balancing powder on a spatula, and then tapping it. This system means that what goes into your medicine is very precise.

We can also use the system to demonstrate when something doesn't work too, which is equally important. For example, in the preparation of an ointment, the particle size of the powder that you add to the base is crucially important; if it is too large it can scratch the skin when applied. We can show good examples, and bad examples, and ways of remedying the latter. The technology allows you to more accurately demonstrate the visual characteristics of a medicine, to make an initial assessment of its quality.

Can you tell me a little bit about how the seminar rooms worked?

The installations in the seminar rooms have been utilised by students in most year groups, for things like calculations and communication skills workshops. They have also been used for project group discussions and in the smaller final year optional module workshops.

The systems are used as an adjunct to teaching, and provide a rich method for recording group discussions that can be referred to beyond the end of the session whilst also providing a permanent record. These records have been used to shape future years' sessions when multiple sessions have been run concurrently, a phenomenon not previously possible with conventional whiteboards.

Students using the new laboratory facilities in the School of Pharmacy

What were the learning and teaching outcomes here?

The students really value small group teaching and enjoy using technology as part of the learning process. Using the BridgeIt™ software, from Smart, we are able to link Smartboards™ in different rooms which allows much more interplay between seminar groups. We are in the process of trialing this, but it is a very different method of teaching and we are hoping that we may also be able to use it to run concurrent sessions with our students in Malaysia.

The system was incorporated into our teaching very easily and was used by all the principal teaching staff. We undertook more demonstrations than before and were able to stop the class at will and demonstrate any concept with which students were struggling with. Brilliant !

When running seminars, staff have felt much more comfortable dealing with issues that have arisen. It is very difficult to change a PowerPoint presentation half-way through, however a hand drawn slide using the Smartboard™ is quick, simple and intuitive and is therefore significantly better for adapting to student need.

You suggest that the technology has embedded well into your current programmes. What impact do you think it might have in the future?

The Medicines Manufacture course will certainly evolve with the new lab system being central to its teaching style. We have yet to fully utilise so much of it's versatility, especially the Smartboard™ element. It will, for example, allow us to show the equivalent processes of medicines manufacture being undertaken in the real life pharmacy or in pharmaceutical industry, and therefore contextualise the exercises being undertaken by students.

The use of the linked seminar rooms will allow easier facilitation of small group teaching, potentially reducing the physical number of staff required for session delivery. This will allow more sessions to run using small group teaching, which can often be more effective. By the very nature of the electronic recording possible, students will also be able to progress independently whilst retaining records, allowing academics to review discussions without the need to always be present.

What about the impact of technology like this in disciplines beyond Pharmacy?

Anywhere where you have small-scale hands-on manipulation which requires dexterity - something like a surgical procedure or how to construct something - could make very good use of this equipment. It gives the students visually an idea of the skills that they need in order to successfully prepare things to a high quality or to accurately manipulate something.

Conclusion

This showcase publication has provided a very brief insight into some truly groundbreaking visual learning innovations at the University of Nottingham. This work already involves thousands of staff, students and researchers, and we confidently expect it to expand and become even more influential in the years to come. New technological advances will undoubtedly allow us to bring even more visual effects into higher education teaching and learning situations, and so add to the benefits reviewed in this publication.

We hope that you have been inspired by what you have seen here, and that you will feel free to contact us, or those who have been mentioned, if you want to learn more. We are even more convinced now than we were four years ago, when we set up the Visual Learning Lab, that visual learning is a powerful resource which is ripe for further development in the higher education sector.

Professor Roger Murphy
Director of the VLL

www.VisualLearningLab.ac.uk