Case Study – Use of Video Clips in a Virtual Learning Environment to enhance the learning experience of our students.

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ABSTRACT

This paper considers how the use of video clips integrated into a virtual learning environment has been perceived by students on a land surveying module within a civil engineering degree. The increasing numbers of students joining many of our programmes has led to an increase in the number of students per practical group (now approx 90). This has resulted in a shortening of time available for one to one direct tuition in the use of surveying equipment. Thus some students may feel less confident in a group asking for procedures to be explained again, and the increasing pressures on student time means that some students miss important explanations. In order to facilitate a more one to one teaching environment it was decided to investigate the use of video segments to enable students to play and replay key processes in their own time.
Videos of parts of the practical sessions were created using a Sony Handycam, then edited to produce short instructional segments to enable students to view these in their own time, and critically in their own environment, and then to implement the key concepts from these clips within their practical sessions. A number of focus groups were convened to investigate the students' experiences of using this medium to enable them to increase their skills and competencies with surveying equipment.

1. INTRODUCTION

At the University of East London we have a long history of education within the land surveying field of study. As such we have a reputation for producing graduates who have an excellent grasp of changing technology as well as the theory behind measurement. With increases in student numbers and a decline in academic staffing levels over recent years, we decided that it was relevant to explore options to enable our students to benefit from, learn and engage with the technology used in land surveying in a supportive manner. These initiatives were designed to enable students to become familiar with different instrumentation while fostering a feeling of control of their own learning experiences. This coincides with the view of Laurillard (2002) in that the success of using any learning technology depends significantly on the ability to embed that technology within the existing learning context. In this case that could equally apply to both the use of specific surveying technology and also the use of video clips.

In this paper the authors will explore their motivation for inclusion of video clips in their teaching and also initial students' views on the usability and effectiveness of them as a learning experience. It will also give technical details of how the clips were created and made available to our students.

2. THE PROJECT.

Total Station instruments are an everyday tool of the practising surveyor and engineer and are the modern, digital equivalent of the traditional theodolite. Improvements to Total Stations to make them more efficient to use, to reduce the possibility of reading and transcription errors, and to add extensive automated functionality have been continual since their introduction in the early 1980s. However, the methods deployed to teach their use to prospective surveyors have invariably concentrated on the principles of surveying rather than using the equipment itself.

The advantages to the surveyor of the new instrument technologies have often focussed on the lowest common denominator of basic functions to speed up observations of angles and distances rather than the practical intricacies of the advanced features. Total station instruments produced by different manufacturers employ a range of different user interfaces. These differences are both digital and mechanical, meaning that menus, commands, terminology and controls all vary. These variations occur not only between different manufacturers but between the various models themselves. Over time this has made it challenging for educational establishments to keep fully up to date with changes in instrumentation. This may mean that, for some graduates, full familiarity with instrument capabilities has been left to post educational training from equipment suppliers and company in-house 'cascading' of knowledge to new employees.

The above problem represents a typical hi-tech dichotomy for educational establishments. Whilst it is inappropriate in the context of a degree programme to attempt to offer comprehensive technical training it is appropriate for students to develop relevant skills in modern and highly technical equipment. This project was therefore designed to enable our students to improve their familiarity with ranges of surveying equipment and in particular to address the issue of confusion that can arise in students' minds when presented with a wide range of varying interfaces found on instruments. The main aim of the project was to supplement and enhance practical classes through a series of video clips designed to illustrate the key points of complex practical tasks including instrument set-up, usage, testing and data logging. By freeing time from repetitive technical descriptions, lecture time could then be used to concentrate on core theory aspects. Critically, students would also be able to 'self- select' the correct video clip for the different instrumentation thus providing them with a personalised tool to engage with the practical aspects of their subject.

A comment sometimes heard from our students is that we as lecturers are there to 'make them learn', to 'teach' them, as if

somehow there can be a direct transfer from what we know to what they know with no application from their side. While this may, genuinely, be the view of some, for all students there is clearly the need to provide a beneficial learning environment which they can truly engage with and provide both the necessary technical and theoretical skills needed in the modern surveyor and civil engineer. *'If students are to learn desired outcomes in a reasonably effective manner, then the teacher's fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes....It is helpful to remember that what the student does is actually more important in determining what is learned than what the teacher does.'* (Thomas J Shuell 1986 cited Biggs 2003)

So how can we engage our students?

The last few years have seen a significant change in the student intake in many universities. This has principally been as a result of governmental polices of widening participation. One of the potential effects of increased numbers could be seen as reduced individual contact time and it may be feared that students could be left to cope without sufficient support. However, while it is clear that student numbers and profile has changed, it is less clear whether any real change has occurred in the teaching or support provision. But, as John Biggs (2003) said: *"Teaching and learning take place in a whole system, which embraces classroom, department and institutional levels,"* leading us to try to provide our students with a well rounded education, in order to ultimately provide graduates that will be in demand.

There is a clear need for students to engage with their own learning experience and it is also clear that there are many drawbacks with traditional methods of teaching such as 'chalk and talk'. In addition, traditional modes may not engage appropriately with students who lack familiarity or required social capital making them uncomfortable with the conventions of lectures, tutorials and self directed learning. We see a growing preference amongst students to use the facility we provide to download and print notes from our Virtual Learning Environment (VLE) as the core of their learning material. While digitally stored, but invariably ultimately printed out, this in itself can be seen as another out-dated, environmentally unfriendly and expensive mode of distributing information. It is also clear that students' familiarity and comfort with a range of alternative communication modes means that other opportunities now exist for us to explore these as methods of communicating our message. Students are more likely to relate to a text message, video clip, or social networking, so why not use this type of technology to engage the students by providing the necessary information for learning in the format they use and relate to the most. Malan (2007) argues that it is the ability of technologies to reach our students and engage them that we should claim as being the significant element in learning and teaching not the technology itself. Our very reason for being academics is to reach our students.

The ideas of podcasting lectures (or in our case video clips) are by no means new. In 2004 Duke University supplied IPods to their 1,650 first year students, (Chan & Lee 2005). These came preloaded with information on administration and a welcome to their students and the campus. After this initial induction use, they then allowed for lectures to be downloadable during the semesters. Further, we can see the rapid penetration of this technology by looking at ITunes University where we see a dramatic growth of courses offering information in a podcast format.

However, our aim has not been simply to utilise an alternative distribution medium but more than that we wanted to encourage our students to genuinely engage with the specialist technology of their discipline. As Hurst et al (2007) have stated, the ability to have lectures available any time any place any where (the Martini learning idea) would surely open up a new range of different learning scenarios. In line with this our aim has been to adopt a learning scenario where the students are comfortable with, and are not overwhelmed by, the use of technology. In planning the project, we needed to be very clear about what we would expect our students to do and what we would hope they would get from using the video clips. Appropriate duration of video segments was an initial problem to address. Chen and Lee (2005) questioned 26 first year students about their use of clips within an information technology module. One of the questions was the length of time they would be willing to listen to these clips per week. Over 50 percent said they would be willing to spend less than 8 minutes with 29.3% less than 5 minutes. So we wanted to create something that would be seen as beneficial, but was also relevant and concise. In fact, our final choice resulted in video clips of nearer one minute in duration as a compromise between hardware and software constraints and learning effectiveness. We were also concerned that the content had to have a practical element that was relevant and tied in with real practical tasks and problems so that students could instantly see that this could be beneficial. This echoes other evidence which links duration and structure to engagement, Malan (2007) notes that the use of 'bite-sized' videos offers students a more focused and structured knowledge on-demand service. In particular, we have noted that our students have been able to engage with not only their own learning experience, but have also had engendered a confidence in their own abilities to use the different instrumentation available to them.

3. METHODOLOGY AND TECHNICAL INFORMATION.

In order to produce the video clips, we chose a good quality camcorder with high-definition capabilities. Although the HD would be stripped off when compressed for final upload, we considered it better to have the full resolution when editing. The files could then be saved on a DVD so the video clips could be recreated at a later date, or re-edited.

Editing was critical, and careful choice of sequences was made to keep the clips to less than one minute duration. Initial tests showed that longer duration clips started to expose data capacity and replay issues as well as losing the students' concentration and interest. It was felt that if we could keep the clips short and to the point then students would be more likely to engage with them, use and reuse them and be able to self-select the relevant clip easily, rather than having to fast-forward within a clip to a short segment. To support the visual content, the text to accompany the tasks videoed was scripted and rehearsed, as is good practice with all video-making.

The Sony Handycam allows for recording in HD (AVCHD) format, which while providing a very good quality of playback does however result in 30MB per minute file sizes making them difficult to handle and requires higher than average specification PCs with extra RAM. The chosen file format of video storage was also an important consideration and we chose to adopt the most common file formats so that we could ensure the widest possible compatibility for the majority of students.

To support the formatting of the video clips and to help to ensure the desired compatibility with different playback devices, we used the VLC software package. VLC is available under the GNU General Public License (GPL) and is therefore downloadable for free. This program emulates the functions of a mobile media player, so that video clips can be checked before they are uploaded. This is a vital step as there can be significant differences between what we see on the computer screen and how it will appear when replayed on a small screen on a mobile media player or mobile phone.

When creating the final files for distribution, our investigations also indicated the relevance of selection of both the file format and the compression parameters set within the format. While this is a standard consideration, when creating files that can be used on a very wide range of devices, it becomes all the more important. Our target playback options initially concentrated on PC based viewing following by a download from the VLE and playback on MP4 players and we subsequently added mobile phone playback to this. Although compression settings can easily be adjusted to produce small files, heavy compression comes at the expense of quality, (Pinnacle Studio User Manual 2008). The authors would recommend always keeping a copy of the original recording in HD in order to facilitate further manipulation.

The Pinnacle video editing software used in this project has the ability to deal with a wide range of video file formats including AVCHD. Additional output formats include iPod compatible files as well as WMV (Windows Media Video). However, new formats arrive on the scene continuously and the MP4 players we selected implement their own file format, the AMV (Advanced Media Video). This format, which has been designed specifically for use with such players, compresses the video signal and audio stream to a convenient size file which plays back on a 50mm screen. However, such files are compressed so much, that play back on a full-size computer screen is not to be recommended due to the pixilation of the image.

A brief step by step procedure is detailed in the following table:

Process	Hard / software	Format	File size (1 minute)
Record the video	Sony cam-corder	AVCHD	30MB
editing	Pinnacle	AVI	220MB
Clips for VLE	Pinnacle	WMV / ZIP	3.7 Mb
Clips for MP4	WMV-AMV converter	AMV	2.0 Mb
Clips for phones	Pinnacle iPod	MP4	3.7 Mb

3.1   The Role of Technology in Students' Experience

The development of mobile devices is such that mobile phones are now far more than just a device for talking to colleagues and friends, as they include internet and Bluetooth technology, opening up a whole new world of communication to a generation unhindered by tradition. Alongside this, devices such as the iPod have realised and revitalised the concept of mobile entertainment. While initially developed for listening to music while on the move, an idea introduced in the 1960's with the transistor radio, the iPod and its rivals now offer the chance to watch movies and television programmes, not only anywhere, but critically at the convenience of the consumer. The popularity of such media players can be seen from the estimates of how teenagers divide their non-school time among their pastimes, suggesting that as much time is now spent using these mobile devices as is spent watching television (Shiels 2008). Therefore, it can be seen that such technology has become second nature, and a media that our students are well versed in using. The possibilities of using podcasting and video podcasting or as in our case video clips in knowledge management are limitless (Ractham & Zhang, 2006). So we needed to make it as easy to use, portable and equitable for all our students on this module.

Although iPods are relatively cheap for an individual, a class set could potentially be prohibitively expensive. However there are now MP4 players on the market costing as little as £20(GPB) each. For this project we chose one such device, the TeckNet V80 which offers a 1.8" TFT Screen, 2Gb of storage and playback of MP4/MP3 files. We selected this particular device, not just by virtue of unit cost, but also because these mobile units could provide the flexibility we sought for mobility for teaching practical sessions and could be economically viable as a bulk purchase. Thus we could enable students without their own personal player to still make use of this initiative. Our aim here was that video clips of more advanced procedures using survey equipment, such as setting out using Total Stations, can be stored on the player, kept in our survey store and signed out with the equipment. In this instance, students can playback the video clip while in the field and learn through emulating the procedure as it is demonstrated on the screen. This approach would allow students to work at their own speed, pausing and repeating elements as required. Making the video clips available alongside the equipment was, in our view, a key component of integrating the students' learning experience. This would support students who make use of survey equipment at times other than when the lecturer is available and as they pursue their own self-directed learning at their own pace. In addition students could also apply their skills using different equipment from different manufactures with confidence that they would be able to familiarise themselves with the change in the system.

In addition to the core video clips, we made use of the functionality built into the MP4 players allowing sub-titles to be displayed over the video stream. This capability was originally designed to display lyrics as music was played. From our perspective we could make use of this approach as an additional resource for those students for whom English is not their first language. This would make these video clips invaluable where the use of supplementary material or explanation is required. (Frydenberg 2008)

A further capability explored with the MP4 players was the option of displaying photographs and graphics in JPG format. This allowed upload of PowerPoint screens which, while saved as JPG so without any animation, would allow further presentation of structured material. Furthermore, WAV files (.WAV) could be created and used to talk students through core processes, again making use of sub-titles. By integrating different material formats and by use of the standard MP4

device functions we could thus combine a range of materials and cater for different students' learning styles and needs.

The files used on the mobile devices were also made available on the VLE. These could then be watched on-screen or downloaded to individual students personal players. There was also the request from students that they be made available in a format capable of being downloaded onto mobile phone from the VLE.

3.2   Using the MP4 player

Our initial tests of the equipment highlighted a number of environmental and usability concerns. To begin with we issued two MP4 players to the students. However, we soon found that the use of the players outdoors was less than ideal as there was too much glare to see the screen. Furthermore, sound replay was inadequate above the general outdoor background noise. It should be noted though that we are based in a relatively noisy environment as we are located on the side of The Royal Albert Dock in London opposite the London City Airport. The alternative we tried, and driven by the request of students taking part in the experiment, was to transfer the clips to their mobile phones using Bluetooth. Using this approach playback was far better although still quiet.

4.   STUDENT VIEWS.

From our research, our initial findings have been very positive as to the benefits gained by students from these teaching aids, when implemented on a range of devices. Students were interviewed during a practical class when they were using video clips in support of their work setting out coordinated ground points using a Leica total station. Their comments ranged from, '*it was great as you could see and hear the stages needed'*, to '*would have been better on a bigger screen if it was not so sunny!'* Evidence from the students suggests that they found the length of video clip used, at approximately one minute duration to be appropriate for the tasks covered and the support required. Furthermore, and encouragingly, students also indicated and they would definitely use the video clips again. They welcomed the ability to be able to take the MP4 devices and the video clips out with the equipment as this enabled them to become familiar with the instrumentation in their own time. Students also noted the benefit of being able to use the material without the added pressure of not only having to complete a task in the practical class but potentially having other members of their peer group watching them struggle with the technology.

Discussions with the students also brought out more information regarding their experiences of using this type of technology to enable and enhance their learning. Four students mentioned that they had regularly used YouTube to view clips on mathematical operations to enhance a module they had sat the previous semester. They did however agree that the longest they would like to listen to such a clip would be 5 minutes, thus echoing the research of Chan & Lee (2005).

Further valuable comments made by the students included that they would like to be able to watch the video clips on a large screen, at home, prior to carrying out work in the field. This would enable them to see what to do, then use the MP4 as an aide memoir in the field. If the clips were available in this dual format and downloaded from the VLE and viewed in the comfort of their own home or in the class before the practical they thought this would give them more confidence especially when faced with slightly different instrumentation than they had used before and were thus already familiar with. They saw this as a very practical way of enabling them with skills that would be needed in future employment, when they would be faced with the use of different instruments, some of which they may not be familiar with.

To enable this latter facility, and to pass on the advantage to the students, the files had to be reformatted so the students could access them at home. As the AMV had lost a lot of detail, it was necessary to add in an additional editing step and return to the data stored in Pinnacle and output it in a suitable format. The main issue with displaying through the VLE is the limit on the size of the file that can be uploaded. Although most VLE's can accommodate 10MB, such files are difficult for some students to download, and virtually impossible without broadband, so the high definition video was found to be unsuitable in this situation. In the end, we decided the WMV would suffice, given the quality of the playback, the size of the file and the ease with which students could playback the clips on their own or the University's computers usually without any extra software.

Basic videos explaining the setting up of the total station or levelling were considered, but as every group of students in the current cohort had already completed such a task, and due to the 'two-handed' nature of the process, it was felt that the portable device could possibly get in the way. As this project has proved to be a success, we will create more of them for use at the start of the semester, taking in to account the need to provide different formats, including purely audio podcasts.

5.   CONCLUSIONS

This initial exploration into the potential use of this technology to enhance our students' learning experiences can be seen as successful albeit with a few operational difficulties to be resolved as we progress in the future.

While students took to the concept developed here well, the glare from the sun on the viewing devices and the sound quality were perceived as drawbacks. However these are relatively minor issues that can be resolved principally with the introduction of higher quality clips viewable via the VLE and viewed before outside activities take place. Also, the inclusion of subtitles could enable students to view the clips but not have to listen to the commentary. However, the production of simple audio files would also allow them to listen and follow the steps without the need to follow on screen instructional material. On the positive side, students did like what they saw and did actively say they would use this again and would like to see it in a variety of different modules.

The introduction of the video clips and the use of VLE's has expanded the range of ways that knowledge can be disseminated to the student body and makes effective interaction through a variety of media. This has enabled us to implement a multi-layered learning approach where the 'chalk and talk' of yesteryear can be replaced by a combination of interactive tools, traditional lectures, seminars, reading material, video clips etc. All students, regardless of their own individual learning style, are then able to access information in a way that is relevant and meaningful to them.

It is hoped to continue this project with other cohorts of students, which would result in the potential to create a fully comprehensive library of video clips that can be used throughout the programme. By embracing the technology that our students are familiar with, in a way that enables our

students, but does not intrude, it is envisaged that this will enhance their experience. Thus we aim to customise our work so as to aid and not invade our students' learning space.

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