The Production and Deployment of an On-line Video Learning Bank in a Skills Training Environment[*]

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Abstract

This paper describes the introduction of videos as aids in clinical skills teaching. Although the process explored focuses on a nursing clinical skills environment it is relevant to many other disciplines.

With the introduction of the pre-registration degree in nursing in Ireland in 2002, the formerly hospital-based schools of nursing amalgamated into larger programmes with their affiliated higher education institutes (HEIs). The result was a considerable increase in class sizes. The current average annual cohort in the School of Nursing, Dublin City University (DCU) is 240 students. This has resulted in a need to review the way we teach clinical skills on campus. These skills form a large part of the programme and are taught to students in the school-based simulated nursing environment to prepare them for their practical experience in the clinical environment. Until 2006 the skills had been taught to groups of 25-30 students using a demonstration and practice technique. This teaching method has posed a number of problems:

- Learning experiences vary depending on the mix of demonstration and practice in each session.
- It can be difficult for students to absorb all of the information presented in a single demonstration.
- It is highly resource intensive.

It was decided that video technology incorporating a large scale deployment of skills videos over a video web server, in conjunction with a shift in emphasis in the teaching contact sessions could offer a useful tool to aid the teaching process. This paper will discuss the production process, the implementation of the project in the teaching environment and the evaluation findings.

Keywords: Video, Clinical Skills, Practical Skills, Nursing, Streaming Video, Mixed Mode Delivery, Blended Learning

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1. Background

The School of Nursing in Dublin City University runs a BSc in Nursing with a major skills component in the first year of the programme. These skills form the core of the students' ongoing practical education and include patient hygiene incorporating bed bathing, shaving and oral care, patient monitoring such as temperature measurement, pulse oximetry and peak flow measurement, patient comfort and safety including admission of a patient to a healthcare environment, patient positioning, aseptic technique, oral nutrition, and respiratory care such as incentive spirometry and administration of nebulisers. Hereafter these skills shall be referred to as clinical skills.

The annual approximate intake is 240. Students taking a skills-based module, "Meeting Fundamental Needs in Nursing Practice", were taught the skills component by a demonstration and practice technique. The lecturer performed the skill after which students participated in supervised practice. There were a number of disadvantages to this method:

- Learning experiences varied depending on the mix of demonstration and practice in each session. In addition there was, in some skills, wide variation in how the skills were demonstrated. While acknowledging there is no single 'right way' of performing some skills, we felt that a standardized approach would be more helpful for undergraduate teaching.

- It could be difficult for students to absorb all of the information presented in a single demonstration.

- It was highly resource intensive as a large student body had to be broken up into small groups for the demonstration and practice. The module included nine fundamental skill areas, each of which was taught to students in two-hour workshops. This resulted in 72 workshops requiring the input of numerous extra lecturers.

A core team was established to address these challenges consisting of the Module Co-ordinator, the Clinical Education Centre manager, two Clinical Skills Nurses and an Audiovisual Technical Officer. This team worked together on all aspects of the video production process. Although each individual had their own specific function within the team we all had input into all aspects of the project which resulted in a polished finished product.

2. Planning with reference to related literature

Before beginning the project the team carried out research looking at existing literature in areas such as video in education, e-learning and blended learning in clinical skills teaching and related pedagogical psychology. The results of this research indicated that combining e-learning strategies such as on-line instructional videos with traditional teaching methods such as face to face demonstrations is more effective than demonstration alone (Lashley 2005; McConville & Lane 2006; Lee & Stuart 2007). A recent study by Bennett and Glover (2008) even suggested the effectiveness of using video alone although this is in opposition to findings of an earlier study by Bauer, Geront and Huynh (2001). After aggregating the results of this research it was decided to use blended learning combining video demonstrations with supervised practice to create a flexible, student centred learning experience such as that espoused by Lashley (2005), Russell Smith, et al. (2006) and Thakore and McMahon (2006).

Projects such as Parkin and Dogra's (2000) used videos to aid the teaching of patient assessment and treatment in a child psychiatry undergraduate course. They highlight the dangers of passive, educationally un-beneficial video viewing. In order to sidestep this potential passivity it was planned nursing students would watch the videos, in most cases, just before doing actual hands-on practice of the skills thereby making the process far more active, by fore-knowledge of and participation in, the up-coming skills sessions.

Parkin and Dogra, furthermore, indicated that it is vital that e-learning materials are targeted at specific areas of the curriculum and are integrated properly into modules rather than attempting to parachute a random e-learning product somewhere into a vaguely related curriculum. Thakore and McMahon also refer to studies "which suggest that e-learning material needs to be integrated carefully into teaching modules if real benefits are to be obtained" (Thakore & McMahon 2006, p.226).

In a study similar to our own, McConville and Lane (2006) drew on Bandura's idea of self-efficacy - "people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performance" (Bandura 1986, p.391). Pajares and Johnson (1993, p.4) further contended "it is self-efficacy that helps explain why people's behaviour may differ markedly even when they have similar knowledge and skills". The McConville and Lane study showed an increase in self-efficacy of students exposed to a situation via video before actually encountering it. This benefit was something we hoped would be a valuable pedagogic driver for the module.

The next stage in planning was to identify the most suitable video format. With this in mind we reviewed our own experiences of video production and of using video in an educational context. We also looked at work carried out by other staff members at Dublin City University School of Nursing (Corbally 2005), and examined wider examples of research into educational video (Moss 1983; Napholz & McCanse 1994) and the work carried out the by EU funded VideoAktiv[1] project especially the collected case studies demonstrating successful use of video in education.

From this analysis we concluded that technical quality in educational video can be extremely variable. While in some cases poor quality video was perfectly acceptable in others it negated any possible educational benefits the piece could have possessed. On further analysis we noted that high quality was not essential in very short videos designed to stimulate conversation in the classroom (such as a video showing a short scenario or a snippet of case study); in other words a technically poor quality video showing a particular short scenario could function very well as an educational tool.

On the other hand, we determined that instructional videos demonstrating specific skills needed a very high technical quality of video production. Unlike videos demonstrating case studies or scenarios, instructional videos do not have a standard narrative drive in the traditional storytelling sense and this makes it more difficult to encourage engagement. (From our own experiences this was backed up by students' reactions to other case study videos we produced later). Higher quality video also allows the user to follow what is happening in detail. The requirement for repeat viewing of skills videos demanded high video quality also. As our planned project fell into this latter video type we had to aim for a high quality level of video production. We decided to pursue the project "in-house" as this would give us the highest

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1 http://www.videoaktiv.org/

level of control (Lashley 2005) over the final products and also help keep the initial cost outlay under control.

Our review also indicated that another challenge regarding the use of video in an educational context was student access to videos. Although it is relatively easy to show a video once in a classroom context, a single viewing in a classroom situation is insufficient for the needs of students expected to learn complex skills. Also, because of the issues and costs involved in large scale duplication, distribution and recall for updating (if necessary) of VHS/DVD material we felt this was not a suitable alternative. We therefore decided to distribute the videos on-line, using an existing media web server within the School of Nursing. This meant that students would always have access to the videos on campus or anywhere in the world with a broadband connection.

Prior to embarking on the full scale project we completed a pilot video to ensure that our plans were workable and of benefit to students.

3. Pilot Video

The project required a high degree of effort and commitment from the team. Therefore we decided that the first production stage of the project should be a pilot video focusing on a single skill, "Aseptic Technique".

This pilot video would be introduced into the teaching cycle and evaluated. We could then begin the second cycle – a large scale production and deployment of skills videos.

The pilot video was developed over the summer of 2005 and was introduced during the academic year 2005/2006. Students viewed the video before the practical session. This was facilitated by means of the video web server that the students could access in time allotted in the computer laboratory directly before the practical skills session. Students could choose between an instant on-line MPEG-4 streaming video feed or they could alternatively choose to download a high quality MPEG-2 version for playing on a local computer. The pilot project was evaluated using a student questionnaire (McGrath et al. 2005) with 86.4% of students responding it was a good way to learn a skill.

The positive reaction to the video – especially to the length, layout and style – encouraged us.

4. Full scale project – the production process

The next stage involved making videos for almost all the skills taught in the first year skills module, "Meeting Fundamental Needs in Nursing Practice". Topics covered include patient hygiene, admission, nutrition, respiratory therapy, patient positioning and temperature measurement. Twelve videos were completed and introduced into module teaching.

The first step of any video production is writing an exact and detailed script. This was particularly important for videos demonstrating best practice in fundamental healthcare techniques. The writing took many rounds of drafting, circulation, feedback and revision. An essential aspect of this process was deciding what material should be included in the video and what should be taught elsewhere (for example giving background information for a skill in lectures). After much debate we felt that these decisions could be best made by recourse to two old sayings – "less is more" and "show, don't tell". There were also technical writing

issues such as making sure the script was not bullet-pointed. Bullet-pointing is often used in an educational context to store and disseminate such information in lecture settings. However video narration demands a more naturalistic linguistic approach. Therefore, although existing lesson plans could form the basis of scripts, they had to be re-written to take account of this. Scriptwriting is one example of where team input into individual roles worked well. The nursing members of the team wrote the original scripts for the videos based on the desired educational outcomes. These were then reviewed by the audiovisual technical officer who offered advice as to what elements would translate well into video format, what would be better taught using other methods, and how best to word the scripts to ensure the audio, visual and text elements were combined successfully.

When the scripts were completed the next stage was determining the resources available and how best to utilise these. As the location, our clinical education centre, and to a large extent staff time was only available during the summer period we decided to film then. We also took the decision to use our funding to recruit paid participants and a voice-over artist as this would give us more control than depending on enthusiastic volunteers to commit a substantial amount of time to the project.

We decided to recruit fourth year student nurses awaiting final results. This was because their baseline knowledge of nursing skills would enable easier direction than teaching an actor an entire skills set. As the students were on the point of completing their programme of study, the skills sets they possessed would reflect current practice. We also felt these students were at a stage where they would be extremely enthusiastic and proud of their nursing skills, bringing additional energy to the project.

Filming was conducted in a single, intensive one week block. We attempted to keep as many subject experts on set during filming as possible, with at least one subject expert present at all times. A daily review of the material helped facilitate subject experts who may have missed some recording during the day and also provided a second viewing opportunity for those who were present at filming. The subject experts present during filming were able to guide the audiovisual technical officer regarding close-up shots and various angles to ensure the best demonstration possible.

After principal shooting, the next stage was to edit the footage and review early drafts to prepare a re-shooting plan (our timetable had included accommodation for several days re-shooting). We were fortunate at this stage of the process to have the video web server - which would later be used for distribution of the final videos - available to us as a production tool. Daily cuts of videos were placed on-line for instant viewing by subject experts, resulting in a far more efficient and useful feedback mechanism than that employed in traditional media production, where viewing can be restricted to production personnel until quite late in the editing process. Feedback was almost instant and continuous, rather than just at milestones in the project allowing for a far superior final product.

The voice-over recording process was quite straightforward. We employed a voice-over artist for two days recording and another half day re-shoot. The re-shoots were mainly to ease transitions on the video that may have appeared clumsy with the original voice-over and images. Having a clinical education expert on hand during this recording was vital to ensure not only that the information and pronunciation were correct but also that the emphasis on vocal delivery of the script prioritised important parts of the procedure.

When all members of the team were satisfied with the draft edits the videos then moved into the final stages of production where graphics resembling presentation slides giving textual information such as equipment needed were added and colour and audio correction were completed. After final review they were then placed on the server for student access.

5. Implementation in the teaching environment

The integration of the videos followed the plan used for the pilot video, ie, the students were advised to look at the videos before the session therefore allowing more time to be spent on actual practice rather than demonstration. The only additional feature was that the videos were made available to students for constant on-line access.

Immediate feedback from students led to us adjusting our implementation plans somewhat. Originally we felt there might be no need for demonstrations in practical sessions at all but we quickly realised students wanted and benefited from a combination of the videos and demonstration (albeit considerably less demonstration than heretofore).

A two hour session that would have previously been broken down into 45min demonstration and 1 hour 15 minutes practice became 0–30 minutes demonstration depending on the complexity of the skill and students needs for further demonstration/explanation with the remaining 90–120 minutes dedicated to hands on practice. Examination of the video web server statistics indicated very high usage from the outset. For example 'Admission to Health Care Environment' was viewed 387 times by 162 students in February 2007, that video being uploaded to the server in the first week of February.

6. Evaluation

A study of computer assisted education (Richardson 1997) found that students felt they were doing worse using computer-assisted instruction but actually performed better, that is, actual learning outcomes can often be quite divergent from student perceptions of learning outcomes. To separate the actual outcomes of the project from the student perceived outcomes we designed a two-pronged approach to evaluation.

Following integration of the videos into the module we evaluated them both formally – using a student attitude questionnaire, and evaluation of performance and knowledge in the selected skills – and informally, using anecdotal feedback from students and lecturers.

The results of the formal evaluation are reported in detail by Kelly et al. (2008). In this paper, we provide a brief summary of the questionnaire responses and anecdotal feedback.

6.1 Student Attitudes /Opinions Questionnaire

At the end of the clinical skills teaching semester (April 2007) a student questionnaire was circulated. The total response was 134 out of a possible 204 students (217 registered for module but 204 is the more likely number as evidenced by other figures relating to assessment attendance).

- 59.7% of students agreed or strongly agreed that they enjoy learning skills through video.

- 66.2% agreed or strongly agreed that they felt prepared for the skills class after they watched the videos although 46.3% agreed or strongly agreed that they would prefer to watch the videos in the skills classes.

- 88.1% stated they would like to have more demonstration of skills by the lecturers in the skills class while 95% stated they enjoy learning skills through demonstration in the skills lab.

- 83.6% of students liked the fact that they could watch the videos in their own time and 80.4% of students agreed or strongly agreed that they will use the videos to revise clinical skills in the future.

This last statistic was corroborated by server statistics for the two days prior to the end-of-semester Objective Structured Clinical Examinations (practical skills examinations) which showed a heavy demand for skills under examination with two skills videos being viewed 147 times by 81 viewers and 116 times by 67 viewers respectively.

In relation to accessing the videos 71.4% reported that they found this easy. Many students reported difficulties downloading the videos to their home computer with only 30.3% of students stating that they could do this. This issue is discussed further in the informal feedback section.

In total, 60.6% of the students reported that they watched between 75% and 100% of the videos. Of the remainder 22% watched 50-74% of the videos, 8.3% watched 25-49% and 9.1% watched less than 25%.

6.2 Informal feedback

Students have indicated that:

- It was a useful reference point later while on clinical practice.

- Students who had used the videos in the first year module actively requested videos for 2nd year skills modules.

Lecturers have indicated:

- Classes are more "industrious" and "hands on", which would reflect student satisfaction with increased control

- The teaching is more standardised. As there is now one definite method of teaching set down for each individual skill it facilitates standardised teaching.

- Other lecturers have begun producing videos because of this project. For example 11 videos have been produced for the paediatric nursing programme using the original project as a template.

The *video web server administrator* indicated:

- The use of the web for distribution was a success overall.

- However the web server used a technology called ActiveX. This is a Microsoft technology used to give web pages extra functionality. However its use restricted users to Internet Explorer as their browser. Many students experienced problems installing these ActiveX controls on home PCs during first use. An on-line manual was therefore produced and 20 minutes of lecture time was set aside to explain how to install the ActiveX plug-in to students.

7. Conclusion

7.1   Notes on the production and integration process

The major factors in the successful development of these educational videos were:

- A project team that worked well together and had input during all stages of the video planning and production process;

- a meticulous, detailed shooting script that was targeted at a particular requirement in the curriculum;

- full control over location and participants with planned re-shoots;

- opportunity for feedback during post-production from the earliest stages;

- easy to use distribution method;

- successful integration of the module into the curriculum.

It is clear that the time taken in improving the scripts was well spent. Not only did it facilitate a smooth production process but more importantly it ensured the final product was eminently suitable for use in the teaching environment. Targeting the script at a pre-existing requirement in the curriculum also helped provide impetus for both lecturers and students to engage with the videos.

Having control over the location and participants was vital from a production point of view. If these factors are not controlled, it not only adds huge risk to the original production shooting but it also makes controlled re-shoots almost impossible. The fact that we controlled these allowed us to plan re-shoots with confidence fixing several issues that may have stopped videos being used for education.

The opportunity for feedback throughout the post-production process was also important in getting the videos to the standards of exactness demanded. Having subject experts regularly looking at video from the earliest point in editing meant many issues were picked up and resolved early. If left, these may have caused further problems down the line.

The ease of distribution to students was also important. A high percentage of students (71.4%) reported in the questionnaire that they found the use of the video server easy. Students also had regular access to a large modern computer lab and some specifically allotted time to view the videos so reasonable opportunity for access was provided for all.

7.2 Evaluation

The primary student concern regarding the project was that they did not want videos to replace live demonstrations. Although it was always the intention of the project to use a blended approach the strength of this reaction does show how important it is to keep the live demonstration in place.

The main benefit derived from the project was the ability of students to watch the videos again and again in their own time. This proved especially beneficial to students for revision purposes.

The increase in self-efficacy engendered by previous viewing of the upcoming skills videos among students also came to the fore with students being more comfortable and confident approaching a practical skills session while lecturers also cited the increased industriousness this created in the class.

Students did also report some technical issues, especially while accessing from home. Providing extra support did help and increasing the ease of use for students accessing materials from home is ongoing and includes dedicated teaching sessions and online instructions stored in a variety of locations.

It is interesting to note that no student complained of failing to follow or understand the skills via watching the videos. The only complaint surfacing in this area was the inability to ask questions of the videos as you could a demonstrator.

Although our evaluation tools had shortcomings the results were positive overall. Even more so when we take into consideration this was applying a very new technology in a live teaching environment with students that may not have a particular interest or aptitude in the area (e.g. a class of multimedia students would have had more interest in the technology being used and its uses).

Further research and monitoring will be essential to definitively evaluate the utility of the videos. This may include on-going yearly evaluation via student questionnaire and a statistical comparison of average results after the videos have been in use for a number of years. Additionally it is imperative that the videos are updated on a regular basis in line with new research evidence and clinical developments. This is essential to ensure that the videos are kept current and do not become obsolete.

8. Acknowledgements

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