Using Video in Health Sciences Teaching and Learning

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ABSTRACT

This paper describes the development and use of three computer based learning packages for Health Sciences students. The packages make use of video and self-assessment questions and are designed to support learning in observational movement analysis, manual therapy and stroke rehabilitation. The background and rationale for their development is presented and supported by underpinning literature and the use of the Click and Go Video Tool. The combination of video with other tools, integration and evaluation of these packages is discussed in relation to the need for visual literacy, learning outcomes, student attitudes and efficacy. Conclusions are drawn about their use and proposed further development and evaluation.

Keywords

Video, Computer based learning, Self-assessment, Health Sciences, Learning

INTRODUCTION

Background and Rationale

Several Computer Assisted Learning Packages incorporating video have been developed for use in various courses at the School of Health Sciences, Robert Gordon University. The initial idea for these materials came from the need for physiotherapy students to be able to practice their observational anatomical movement analysis. Students are required as part of their module learning outcomes for Applied Anatomy to be able to:

> Observe, analyse and describe normal functional movements using anatomical terminology.

Physiotherapy students therefore have an underlying need to develop visual literacy and will continue to develop their observational skills as undergraduates and postgraduates using it to assess patients' problems and progress. This skill is usually taught in practical classes with a classmate acting as a model performing various activities, which the student observes, analyses and describes with feedback from the tutor. Students are then required to practise this activity in their own time. However this presents several difficulties for the student. A model is required and may tire after several repetitions of the movement, producing minor anatomical changes in performance and invalidating the original analysis. If the students are practising in their own time, no tutor will be present and therefore appropriate feedback to that unique situation will be unavailable. Rowntree (1990) recognises that even in conventional instruction learners spend time learning on their own from existing materials such as books and journals but acknowledges that private study materials are rarely created specially for them with their needs and courses in mind.

To facilitate independent study and practice, a web-based package (The Movement Analysis Package) was developed to allow students to watch looped video clips of different movements integrated with a question package allowing them to submit their answers on-line and receive feedback on their attempts. French et al (1994) have emphasised the importance of skill practice and suggest the use of videos as an adjunct to individual practice out with teaching sessions. The Decision Tool including the three I's quiz (Thornhill, Asensio and Young 2002) has also been used to inform this process. It was found that although the project scored fairly evenly on Image (2) Interaction (4) and Integration (3) Interaction was the highest priority. This is possibly because the package is intended to provide materials for self-study and assessment. Smith and Andrews (1985) state that the deficiency of conventional linear video is that it lacks the ability to elicit and accept use responses and provide feedback within the program. Computer based video in the form of clips embedded into self assessment tests provides this interactivity and is therefore more likely to stimulate adult learning. Cennamo and Dawley (1995) state that self tests included in the design of interactive video can help adult learners to identify knowledge deficiencies and misconceptions therefore enabling them to set their own

learning goals more effectively. However image and integration were also deemed important factors in the design process as the questions are largely based on the students' observations and study relates directly to a conventionally taught course and supplements a particular module within this course. The practical considerations of designing and creating the package will be discussed in the next section.

The pilot evaluation of the Movement Analysis Package (Cooper and McConnell 2000) showed high levels of student satisfaction and highlighted that this package may also be of use to other courses studying anatomy as it allows the application of anatomical knowledge facilitating revision and deeper learning of the subject. Ellington and Earl (1996) emphasise the importance of approaches that encourage deep rather than surface learning. Self study encourages such an approach and students who adopt a deep learning approach have been found to be more enthusiastic towards self study (Jones and Kember 1994). The Movement Analysis Package has now been integrated into various health science courses and evaluated by different groups of students (Cooper and Ogilvie 2003).

Student focus groups (Cooper and Ogilvie 2003) suggested ways in which the package could be further developed to create other resources for self-study. A need to develop videos of dysfunctional movements relating to a particular pathological condition was identified. Neurological pathologies require therapists to apply their observational skills in assessment and treatment of the patient. (Edwards 2002) Students would visit the hospital rehabilitation department specifically to observe these patients undergoing assessment and treatment as part of their neurology module. However the number of students in each year has increased and it is no longer possible to accommodate these larger groups in this way. A possible solution would be to allow students to observe a patient with this condition through video. Access to the video would be improved if computer based and, as with the Movement analysis package, further information, self-assessment and feedback could also be incorporated.

The students also suggested that videos of manual therapy techniques would be useful to allow their continued learning and revision of this skill. (Cooper and Ogilvie 2003). These packages are currently undergoing evaluation.

VIDEO AND PACKAGE DESIGN AND DEVELOPMENT

The Movement Analysis Package

The package consists of web pages constructed in HTML and javascript with embedded MPG video clips. At the time of making the videos streamed video was unavailable. The videos were made using student volunteers who signed a consent form after reading an information sheet and discussing the project with the developer. It was important that the students being filmed understood that their images would be released on our Intranet and may also be published as part of academic articles. The Click and Go Guide (Thornhill, Asensio and Young 2002 Appendix 3) also suggests using a consent form. The videos were taken from different camera angles using two cameras, as it is important that students are able to view the different body parts to identify joint positions and muscle work. It was therefore also necessary to expose the limbs and trunk of the subjects being filmed while maintaining their dignity and decency. Sound was not required for these clips. The original tapes were edited and the best clips were shown as a short continuous loop. In some cases the different views are threaded together in the same clip and in others it was decided to let the student choose to play a different view separately e.g. a close up view of the foot in stepping.

The first page is the table of contents with links to instructions on how to use the package, the menu of normal movements to analyse and a glossary. Students are taken through each movement joint by joint and asked to identify the starting positions, intermediate positions (if applicable) and finishing positions from a list of choices. They are also required to identify the muscles producing the movements and the type of muscle work in the same way. At any time during this process the student can play the video clip and stop and start the movement as they wish. Feedback is given as they submit the answer to each question in the form of a pop up box containing information about which responses are correct and which are not. A running total of the student's score is also kept. Milheim W. (1996) recommends interactivity in CBL packages and recommends easy to use navigation; interactive questioning and personally meaningful feedback is incorporated. Narciss S. (1999) studied the effects of CBL feedback on motivation and performance and found that greater informativeness of feedback leads to better performance. To allow students to find out why they had made a mistake a link to a glossary is provided at each stage to enable the student to look up definitions of movements, muscle actions and attachments. The package is integrated into the applied anatomy module material based on the Robert Gordon University Intranet (RGU iNet). This is a virtual learning environment, which can be accessed by the students on and off campus. Module materials such as learning outcomes, study guides, lecture slides, handouts, and in this case self-study materials are accessed by the students through this environment.

The advantage of basing the package here is that students are directed to the context in which the package is to be used and can readily see its relationship to the rest of the module. Also students are already familiar with the virtual learning environment following their induction to the course and from use in previous modules. It was also felt that to avoid students coming to the package "cold" and to familiarise them with how to navigate and use the package, an introductory session should be timetabled. Following the initial evaluations (Cooper and McConnell 2000) students identified their lack of confidence in using the package without the presence of a tutor. To address this concern the package was linked to the virtual learning environment community group related to the module to allow students access to an e-mail help line and a forum for less formal feedback about the package. The group moderator is notified of any new messages immediately and responds the same day to any problems. Students are also encouraged to help each other.

The Manual Therapy Package

This self-study package consists of instructional videos and self-assessment questions on two different manual therapy techniques, Maitland mobilisations and McKenzie exercises (Maitland 2001 and McKenzie 2003). The application Question Mark Perception has been used to embed the videos and create the questions and feedback. Bull, Sapsed and Zakrzewski (1998) developed a distance learning package for midwifery students on the foetal skull and used an earlier version of this application (Question Mark Designer) to create their self-assessment materials. Following their evaluation they found that the students found this method of study enjoyable and felt it enhanced their learning. They commented that the limitations of the software at the time may have lead to the design rather than the content of the questions being a little simplistic (Bull et al 1998) but this most recent version allows for greater ingenuity in question design and the incorporation of multimedia. The multimedia department at Robert Gordon University filmed students and a member of teaching staff who again volunteered and gave their consent to be filmed. The videos were filmed using a digital camera and edited into streamed clips in an "rm" format. The videos are embedded in the self-assessment tests as an HTML hyperlink. There are two different versions of the tests, one for university access and the other for home access which use different URL addresses for the video clips to accommodate the different bandwidths needed for LAN or modem access.

The videos show the lecturer demonstrating and talking through a series of manual techniques on the live model and also on a skeleton spine. It is hoped that this will not only allow the students to revise and practise their techniques but also aid their understanding of how each technique effects the movement of the spinal joints. The package is accessed through the RGU iNet alongside supporting module resources and again is linked to a community group. It is used as part of the learning resources for the Manual Therapy module in the BSc Hons Physiotherapy course and the Musculoskeletal module for the MSc (pre-registration) Physiotherapy course. The students are introduced to the package at the beginning of the module in a timetabled session but instructions are also given on-line.

The Stroke Package

It was felt that the first package to support learning of dysfunctional movement analysis should be based on Stroke. Assessment and treatment of this type of neurological condition requires a high level of observational skill. The Neurology module is delivered at the beginning of the students third year in the BSc Hons Physiotherapy and Occupational Therapy courses and in the third semester of the first year of the two-year MSc (pre-registration) Physiotherapy course. At this stage some students may have seen patients with these conditions on clinical placement but most will not and therefore have difficulty in visualising the clinical presentations of these types of conditions. Observational analysis is an important component in the assessment of neurological patients (Stroke Book) Visits to the rehabilitation department are no longer feasible, it is therefore essential to provide an alternative means for the visualisation and observation of this type of condition.

This package is similar in design to the manual therapy package and the two versions are also accessed in the same way through the RGU iNet. The video filming however presented different challenges, as a patient who had suffered a severe stroke was the subject of the video. It was therefore necessary not only to gain his consent, but to also acquire the approval of his next of kin and his consultant physician to ensure he was medically fit enough to take part. Two chartered physiotherapists and a physiotherapy helper were also filmed and their consent gained. The video depicts an entire assessment and treatment session of the patient in lying, sitting and standing. Various views were filmed so that students would be able to see the patient in as similar a manner as possible to real life and close ups were also taken to allow for greater visibility of muscle and body contours. The patient was required to be dressed only in shorts, as he would be for his usual physiotherapy session, and care was taken to maintain his dignity and decency. The finished video was edited into a series of

short clips and each was embedded using HTML in the self-assessment tests created with Question Mark Perception. The tests are also linked to fictitious case notes and investigations such as a Computerised Tomography (C.T.) scan. Instructions, other study materials, and a revision test on the related pathology of the condition are also provided. The students are again introduced to the package in a timetabled session.

DISCUSSION

Designing for Interaction

Image, interaction and integration were all important factors considered in the design process. It is necessary for the images to be as realistic and clear as possible, which necessitated the use of real subjects and presented the problem of consent. It was important that the subjects were aware that the videos would be based on the iNet but that they may also be presented at academic conferences and in journals. The iNet is password protected and this may have reassured the subjects. One advantage of presenting the videos to students in the computer-based format is an increased access to the resource. The unedited VHS version of the stroke video has been used in the teaching of the neurology module during the development of the computer-based version but the only copy is held by the lecturer and viewed by the class in controlled groups. Multiple copies of the video would present a problem with security, which could compromise the consent granted by the patient. Informal feedback from the students and teaching staff suggests that they found even the restricted use of the VHS version of the video helpful in visualising the clinical presentation of this type of patient. The computer-based videos allow access from home and university and enable the individual student to repeat and pause each clip, as they require. They are also able to navigate through the sequences as a whole more easily by browsing the index or headings of the package sections and choosing the order in which they view and interact with the material. Clarke (2001) reinforces the importance of video quality as familiarity of learners to these media leads to an expectation of the high quality they are used to. In the early stages of the package development and evaluation some technical problems were associated with playing the videos. The computers used to evaluate the Movement Analysis Package were old and slow and did not allow the package to be accessed outwith the university as it was based on the School of Health Sciences shared drive. The second evaluation showed that these technical problems were a source of frustration to the students (Cooper and Ogilvie 2003). The development of the RGU iNet and an upgrade of the computers to Windows XP have ensured fewer technical problems. However, the movement analysis package will only play the videos if Windows Media Player is used and the streamed clips can only be played by Real Player. Instructions are now given at the beginning of the package on how to access the correct player. Sound is included in some of the video clips to allow explanation of the techniques or activities being observed but was removed from some of the stroke clips when it prompted the students with the answer to the assessment questions. In future clips the students could choose to play the sound once they have attempted to answer the question and this would provide further feedback.

To further enhance interaction the videos are embedded within self-tests providing feedback on the students' answers. The correct answer is given should they answer incorrectly as recommended by Cennamo and Dawley (1995). Van der Velden (1999) supports this view by saying that allowing students the opportunity to fail and retry helps to develop knowledge they can use creatively, feedback should give the student an explanation about why the mark has been given. Should the students require more information about why they are wrong the packages are linked to other study materials for the module and all are linked to a community group which allows feedback on student problems and also the collection of informal evaluative comments on the package. It is hoped that increased familiarity with this resource will lead to the development of student study support groups so that the tutor is able to facilitate collaborative learning (Palloff and Pratt 1999). It is hoped that evaluation of these new package versions will show that this highly interactive design is effective in supporting the students' learning.

Integration and Evaluation

Lawton (1996) suggests that if information given in self-learning is related to the adult's existing knowledge then there is more chance of learning occurring. Van der Velden (1999) also states that to avoid the separation of knowledge systems and students being unable to relate what they have learned to other parts of the course the package should be related to something they already know i.e. the rest of the course content. Basing it within the RGU iNet facilitates integration of the package to the existing course and module material. Introducing the students to the package in a timetabled session within the module enhances further integration. This not only allows them to ask any technical or practical questions but also allows reinforcement of how and when they should use the package in relation to the module delivery as a whole. Evaluation has revealed that this had also been of concern to the students (Cooper and Ogilvie 2003).

Cennamo and Dawley (1995) have stated the importance of establishing a need to know within adult learners in order to create a readiness to learn new information. They suggest relating the learning materials to a problem which may have been achieved by focusing the clinical packages on patient assessment and treatment, allowing the students to see the clinical relevance of their study. Use of the Movement Analysis Package has been extended as a summative assessment of the Kinesiology and Biomechanics module in the BSc Hons Sports and Exercise Science course (Hornby et al 2003). The package is therefore used to test the students' ability to achieve the learning outcomes of the module; relating the material to the learning outcomes also enhances their integration.

Any new approaches to teaching and learning should be evaluated to ensure they are effective and acceptable. Evaluation of the Movement Analysis Package indicated that it is a valuable tool for helping different groups of Health Science students in their study and practice of Applied Anatomy. It has also provided very useful information for its improvement and the development of further computer based multimedia packages (Cooper and Ogilvie 2003). Other studies have also found that this form of study is effective and acceptable to Health Science students. Dewhurst D. et al (2000) developed and evaluated a computer based learning package on the cardiovascular system with physiotherapy students and found that they had positive attitudes towards this method of study. Kohlheimer et al (2000) and Buchowski et al (2002) evaluated the instructional efficacy and acceptability of similar computer based materials incorporating video case studies for the study of nutrition with medical students. They tested the students' knowledge before and after using the materials and both studies found that the materials were effective in teaching this subject to medical students. Although they did not specifically study the students' use of the videos. Green et al (2003) evaluated the use of streamed video in a life sciences module taken by nurses. The videos were linked to self-assessment and based in the Blackboard virtual learning environment. They found that students used the resources, enjoyed them and were confident that they had learned from them. However some problems were noted with accessing the materials from home and they were unable to determine the extent of video use. Evaluation of the clinical packages for Stroke and Manual therapy is on going. A questionnaire is used to discover student attitudes to the packages and summative assessment will also take place to determine their effectiveness. It is hoped that through the reporting facilities in Question Mark Perception a clearer picture of how the resources are used will emerge. Embedding of the videos within the self-assessment packages, as a specific section, should allow insight into the use of the videos both at home and at the university. It is intended that these resources, if effective and acceptable, will be used not only by a diverse number of Health Science courses but will also prove useful to qualified staff for their continued professional development.

CONCLUSION

Streamed video has the potential to provide students with greater access to real life situations related to their area of study. This valuable resource requires a great deal of time and effort to create, it is important therefore to decide on the best means of design, interaction and integration of the videos. The main advantage of computer based streamed video over conventional video is that this interaction can be developed and if effective will enhance learning. These materials and methods of learning will be more acceptable and enjoyable to the students if they understand the context of their use and if technical problems are minimised. As our e-learning capabilities continue to evolve and improve development and thorough evaluation of these "state of the art" learning materials is essential to rise to the challenges of more flexible and life-long learning.

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