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EDUCATION

Internet Videoconferencing in undergraduate paramedic education

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Abstract

This paper illustrates the innovative use of Internet Videoconferencing in a blended and case-based learning approach used to support undergraduate paramedic student learning during weekly clinical problems. Regular Internet Videoconferencing learning periods were offered to students by teaching staff, increasing after-hours communication opportunities otherwise not normally achievable. Whilst encouraging learning outcomes were achieved with some students, other students encountered barriers such as lack of available bandwidth, inappropriate computer hardware and preference for face-to-face contact.

Introduction

Case-based learning (CBL), via a blended approach, is central to the learning framework used in the Bachelor of Emergency Health (BEH) program at Monash University. The aim of this paper is to describe the use of Internet Videoconferencing in a blended learning CBL approach for undergraduate paramedic students, attempting to support student learning and to potentially increase student-to-student and student-to-teacher real-time communication and learning opportunities.

The Higher Education sector is undergoing transformation in its educational delivery and philosophy, given the expectation of mobile learning, ubiquitous connectivity, and that graduates are equipped with Information, Communication and Technology skills.[1] Internet Videoconferencing is one such educational tool that offers potential teaching and learning solutions. Internet Videoconferencing is considered a well-accepted and viable means of delivering educational content in both distance education and blended modes.[2,3] Blended learning has been provided with several definitions.[4-6] For the purposes of this paper, blended learning will be defined as the combination of: "online teaching and learning with face-to-face instruction".[7,8] Using the flexibility of a blended learning approach and integrating the advantages of Internet Videoconferencing, it was hoped that this educational approach could provide added student flexibility and greater feedback from faculty.

Literature Review

A variety of articles cite the benefits of Internet Videoconferencing in its capacity to provide education and communication regardless of physical locations.[2,3,9-12] This 'merging' of geographic boundaries is well illustrated in the descriptive study by Waddell et al (1999) where the authors successfully offered a short course using case studies to undergraduate nursing students from England and the United States. The integrated use of Internet Videoconferencing in this study produced high levels of student enthusiasm and learner

enjoyment.[3] Moorman (2006) describes the use of Internet Videoconferencing to support students' learning in teaching gross anatomy.[13] Using a descriptive approach, Moorman found that Internet videoconferencing was well received by his students for its capability to deliver education sessions to students in geographically dispersed locations. Other papers also reinforce the high levels of student satisfaction and improved student to teacher interactions in their respective primary health care distance education programs.[3,13,14] Several of these also describe some of the likely educational benefits and educational barriers to student participation. Some of these barriers included appropriate bandwidth, use of hardware devices such as webcams and headsets, and interactivity support.[9-11] Additional advantages and disadvantages of Internet Videoconferencing is described in (Table 1).

Two other papers[15,16] described Internet Videoconferencing from a technological point of view and examine the future use of Internet Videoconferencing for megaconferences, colleges and higher education institutions. These papers suggest that educational technology such as Internet Videoconferencing offers and enables partial solutions to e-learning teaching and learning and general distance education approaches.

Table 1. Advantages and disadvantages of Internet Videoconferencing[2,3,9-11]

Advantages
Increased capacity for peer-to-peer learning
Greater study flexibility
Reduced travel times/costs
Reduced teacher/tutor contact time
Improved formative feedback
Disadvantages
Preference for face-to-face contact
Not personal
Reliance on educational technology and associated software and hardware
Dependent on adequate Internet bandwidth
Netiquette issues
Equity issues

Bachelor of Emergency Health

The BEH is a paramedic pre-employment undergraduate degree, offered full-time on-campus over 3 years at Monash University. The use of CBL, via a blended approach, is central to

teaching in the clinical units, with approximately two-thirds of the content delivered face-to-face (F2F) and the remaining one-third using e-learning approaches such as podcasting, interactive wireless keypads and Internet Videoconferencing. The use of CBL attempts to create an authentic clinical learning environment for undergraduate students and is well-documented in the literature.[17-20] Cases involve "an account or development of a situation or sequence of events, which raises issues or problems for analysis and solution".[21] The CBL approach uses the case as a basis for discussion and discourse between students and students and teachers. It supports the notion of student-centred learning by engaging students in an authentic situation. This notion is particularly important given the unpredictably of the out-of-hospital environment in which paramedics work. When combined with discussion (verbal and written) it has the potential to motivate students to take more responsibility for their learning and encourages self-directed learning and peer learning. It shifts students from a passive learning approach to an engaged approach. The role of teaching staff also changes from an expert or knowledge dispenser to a coach, facilitator and co-learner.[22,23]

Attempts are made to align students' learning around the DREEM model (Discovery, Responsibility, Empowerment, Emancipation, Motivation).[24] Weekly clinical cases are uploaded into the learning management system (Blackboard) and structured around a modified Maastricht 7-jump learning process as described in Figure 1.

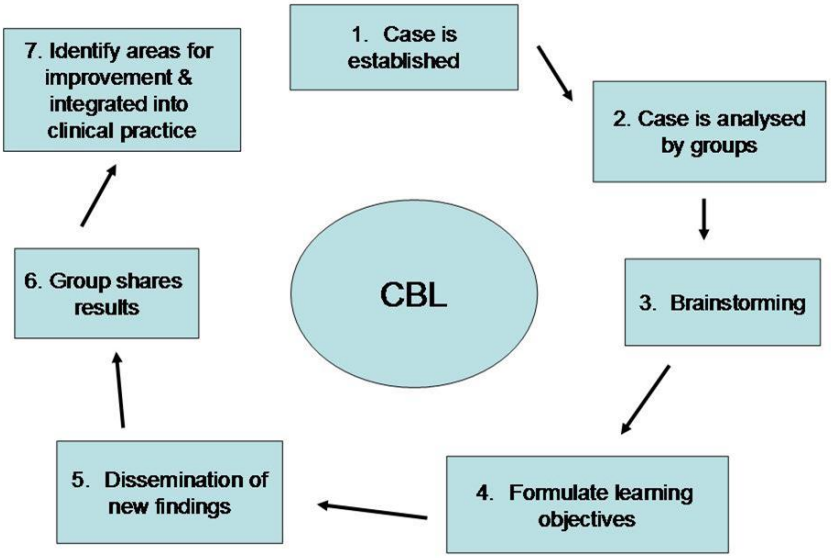
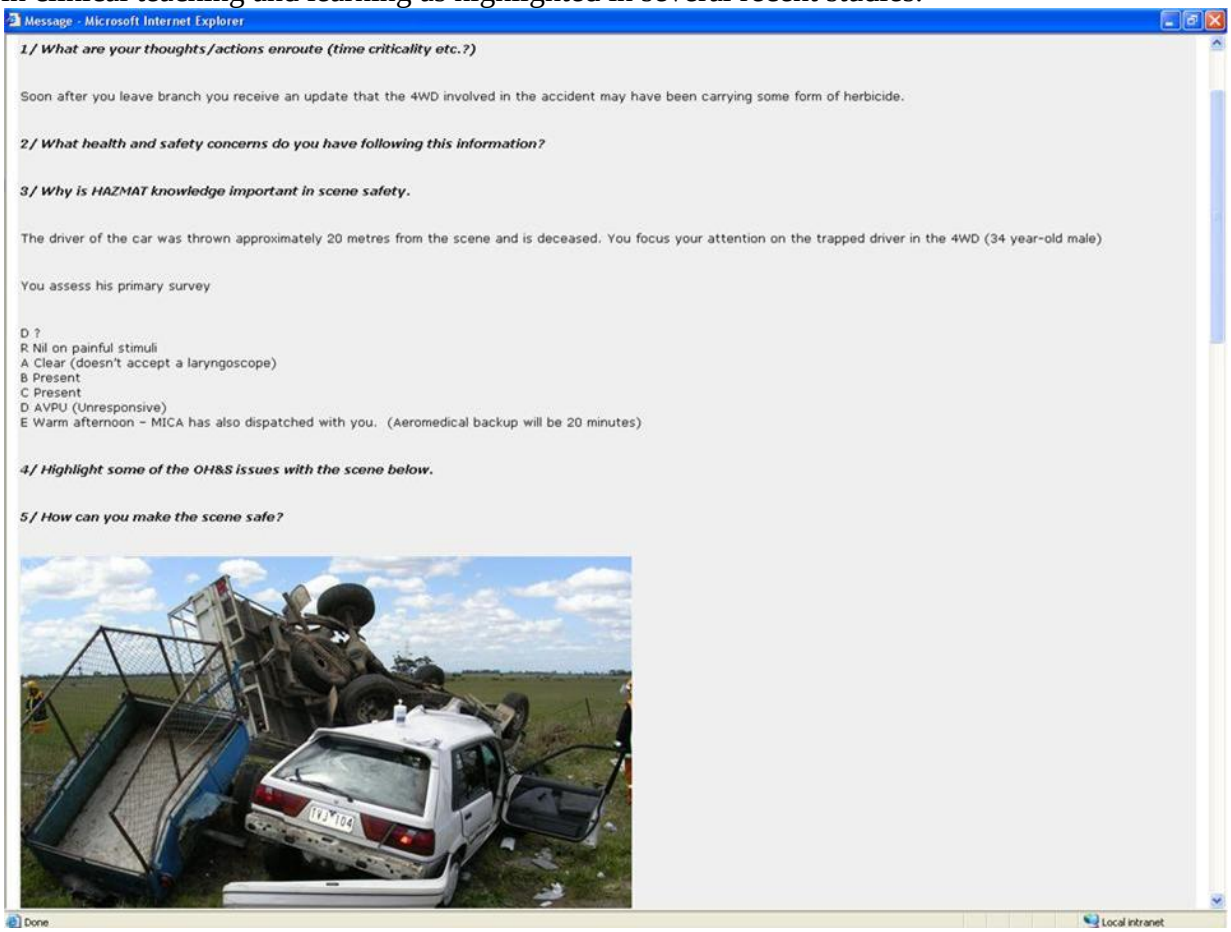


Figure 1: The CBL process (adapted from Maastricht PBL 'Seven-Jump' process[19,20]

Authentic clinical cases are provided at the conclusion of the main face-to-face (F2F) lecture on Mondays and are uploaded into Blackboard see (Figure 2). Students are allocated e-tutorial groups within Blackboard and are expected to de-construct the clinical case as a group, regularly moderated by faculty staff. These e-tutorial groups, whilst having limiting factors such as asynchronous communication, are structured in a manner that has similar educational aims and functions to standard F2F tutorial groups. In other words, the aim of these groups is to provide small group discussion whilst supporting the notion of peer-to-peer learning which is more difficult to achieve in larger lecture environments. Blackboard allows the author to provide students with an authentic and interactive method of presenting realistic clinical cases and often includes supporting video and audio files, for example lung or heart

sounds that are essential for paramedic professionals. Increasing the authenticity is important in clinical teaching and learning as highlighted in several recent studies.[26, 27]


Message - Microsoft Internet Explorer

1/ What are your thoughts/actions enroute (time criticality etc.?)

Soon after you leave branch you receive an update that the 4WD involved in the accident may have been carrying some form of herbicide.

2/ What health and safety concerns do you have following this information?

3/ Why is HAZMAT knowledge important in scene safety.

The driver of the car was thrown approximately 20 metres from the scene and is deceased. You focus your attention on the trapped driver in the 4WD (34 year-old male)

You assess his primary survey

D ?
R Nil on painful stimuli
A Clear (doesn't accept a laryngoscope)
B Present
C Present
D AVPU (Unresponsive)
E Warm afternoon - MICA has also dispatched with you. (Aeromedical backup will be 20 minutes)

4/ Highlight some of the OH&S issues with the scene below.

5/ How can you make the scene safe?

Done
Local intranet

Figure 2. Example of realistic clinical case

Real time or synchronous communication strategies are utilised to broaden student experiences during the weekly case, and allow students to seek clarification on case questions in a timely manner. Synchronous communication via Internet Videoconferencing allows discourse amongst students and faculty staff. Again, these sessions discuss and support peer-to-peer learning as in the traditional F2F tutorial classes, but the Internet Videoconferencing sessions provide students with the capacity to undertake this *virtually* from the comfort of their own home. These sessions are aimed at offering students additional learning support and opportunity, otherwise not achievable within academic timetable constraints. The case-based learning and process solutions are finalised on the following Thursday ensuring that all unanswered and new questions are confirmed prior to the commencement of a new week and clinical case. Of prime concern is student equity, especially for those who do not own a computer or do not have the appropriate Internet speed required for Internet Videoconferencing. For those students, any 'new' information discussed in these meetings is emphasised in the Thursday F2F session, thereby ensuring they are not disadvantaged by not participating in Internet Videoconferencing sessions.

Internet Videoconferencing

Internet Videoconferencing allows participants working from a computer to send video (Webcam) and audio (headset or microphone) to other participants (students and/or teaching staff). In other words, a real-time and two-way communication process is established.[15] The software currently being used by Monash University for online conferencing sessions is

called 'Marratech', although other software programs exist such as Elluminate, Macromedia Breeze and Mediasite. Standard Videoconferencing and tele-education has been introduced as an educational alternative in a broad range of disciplines for many years, with papers suggesting this type of teaching is not only cost-effective but also a well-established method of teaching students in both distributive and distance education modes.[28-35]

Marratech is an international Web conference provider that provides teaching facilities such as Universities with an Internet Videoconferencing facility, which allows a collaborative approach between teachers and students in 'real-time', without potential frustrating delays. The Marratech Portal runs on a central server and the Marratech client is downloaded to the students' computers. Marratech is also available to participants in student-access computer labs available at the university see (Figure 3).

Figure 3. Students using Marratech student computer lab

The integration of such a software program offers real-time audio with chat and video file features. A key feature allows the integration of PowerPoint slides with whiteboard capabilities (Figure 4). These features allow the teacher to draw, highlight and emphasise the lecture's main points with the students. These functions form an important toolkit for reinforcing the learning goals of each weekly case problem, and provide an on-going link between what has been covered in the F2F lecture and discovered in the e-tutorial groups. Other functions such as file-sharing are available, although this has not been used in these teaching sessions.

Consideration of student computer download speeds is taken into account with the development of a student resource CD-ROM which contains Marratech set-up files. The Marratech portal runs continuously so students and faculty can talk to each other at any time. Up to two optional sessions a week are offered to students either on Tuesday afternoons or

Wednesdays evenings; however it would be possible for student-student or student-teacher to organise meetings at other times. These sessions are offered to support the weekly case and also to improve timely and constructive feedback.

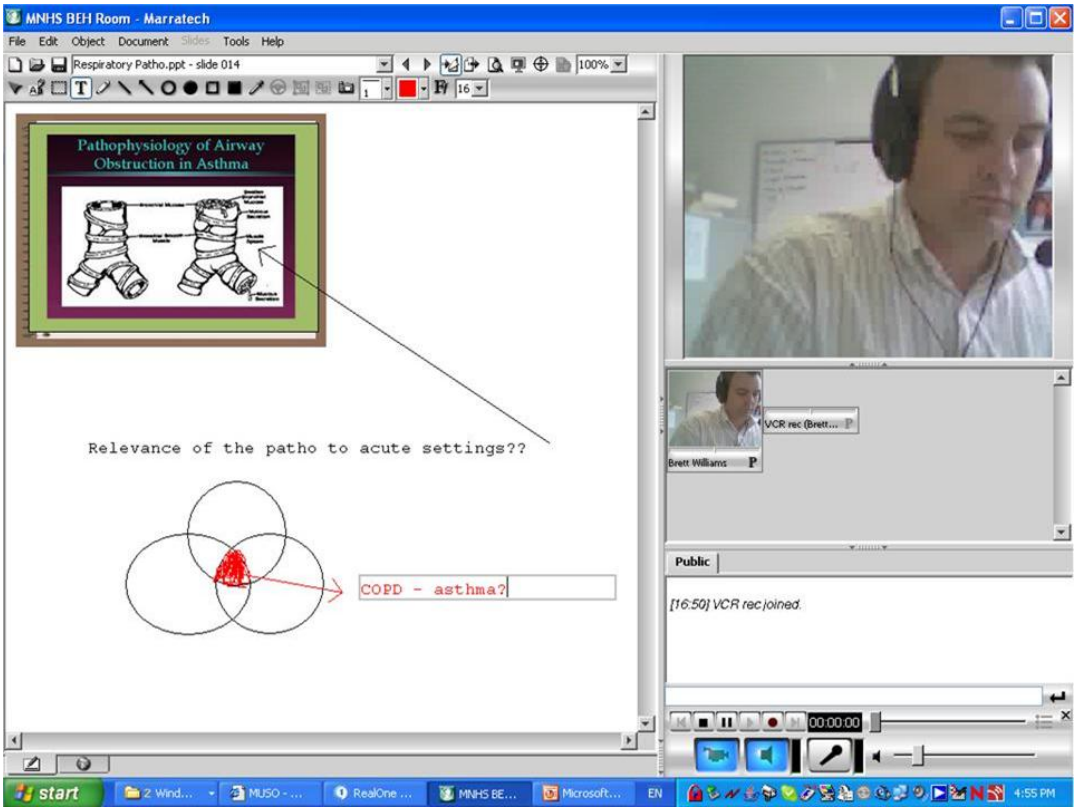


Figure 4. Example of the Marratech Portal using PowerPoint slides

User Requirements

The minimum requirements for the Marratech client to run on computer/laptop include the following:

Processor:
Pentium III or above
RAM: 512 MB
Display: minimum 1024x768, 16 bit colour
Video Capture: most USB Web cams (optional)
Operating system: Windows ME, 2000 or XP
Audio card: supports full duplex (i.e. can listen and talk at the same time, as on a telephone. All standard computers would have this.)
Internet connection: Minimum ADSL/cable connection at 256K/128K.
Dial-up modems at 56K will have difficulties.

Students are also provided with a 'How to install Marratech' handbook, illustrating the step-by-step instructions on installation and tool navigation.

Further Research and Implications for Paramedic Education and Training

The amalgamation of blended learning, CBL and synchronous communication using Internet Videoconferencing has yet to be reported in the literature and illustrates the contemporary nature of this teaching approach. Therefore, further research and examination of educational technology tools such as Internet Videoconferencing is timely and warranted. This analysis might include closer investigation of the student learning landscape and potential correlation between educational technology, social learning theory and generational learning. More formal evaluation of Internet Videoconferencing will be undertaken in 2010 using a mixed methodological approach of paper-based surveys and focus groups.

These studies will have educational implications for the provision of emergency health care. The ubiquitous advancements in educational technology, along with the continued extra demands and burdens being placed on health systems, suggests that alternative and innovative means of offering teaching and learning as one potential solution. The possible benefits of tools such as Internet Videoconferencing might include the internationalisation of curriculum, capacity to offer multidisciplinary teleconsultations or clinical rounds, and alternatives in clinical placement/fieldwork/laboratory rotations.

Conclusion

Informal evaluation suggests that students who actively participate in CBL Internet videoconferencing tutorials find these sessions important and valuable in achieving their learning objectives. However, several concerns by other students have emerged that suggest that, despite this synchronous communication and feedback with faculty staff, some students found this inconvenient or simply preferred F2F contact. Further examination of mobile-learning for undergraduate students and the use of educational technology such as Internet Videoconferencing are warranted.

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