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CONTINUING EDUCATION

2.5 ANCC Contact Hours

Using the Technology

Introducing Point of View Video Glasses Into the Simulated Clinical Learning Environment

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The introduction of learning technologies into educational settings continues to grow alongside the emergence of innovative technologies into the healthcare arena. The challenge for health professionals such as medical, nursing, and allied health practitioners is to develop an improved understanding of these technologies and how they may influence practice and contribute to healthcare. For nurse educators to remain contemporary, there is a need to not only embrace current technologies in teaching and learning but to also ensure that students are able to adapt to this changing pedagogy. One recent technological innovation is the use of wearable computing technology, consisting of video recording with the capability of playback analysis. The authors of this article discuss the introduction of the use of wearable Point of View video glasses by a cohort of nursing students in a simulated clinical learning laboratory. Of particular interest was the ease of use of the glasses, also termed the *usability* of this technology, which is central to its success. Students' reflections were analyzed together with suggestions for future use.

KEY WORDS

Usability • Video recording and analysis • Wearable computing technology

The introduction of video technology into nursing education in myriad ways assists with the application of theoretical knowledge to clinical situations. Nurse educators have suggested that video recording and playback of skills demonstration can promote critical thinking and assist in the development of quality, safety, and leadership competencies in nursing students.[1] Some educators suggest that using video recording for educational purposes helps to bring new and imaginative perspectives to almost any subject matter.[2] In particular, using video recording as a teaching and learning tool can encompass the systematic and creative blending of product and idea technologies and engender teaching and learning processes within and across disciplines. Therefore, it makes an ideal teaching and learning strategy in healthcare settings.

However, the literature suggests that this technology must have perceived *usability* in order to ensure that it is accepted and operated efficiently and effectively.[3]

In this article, the authors explore the introduction of wearable technology in the form of Point of View (POV) video glasses (EDUPOV2), (EDUPOV Pty. Ltd, New South Wales, Australia; more information about the glasses is available at http://wiki.tafensw.edu.au/sydney/mylearning/index.php/EDUPOV_2), by first-year master of nursing (entry to practice) students in a simulated clinical learning laboratory. Students were able to record and review their own video playback to critically analyze their performance of a clinical psychomotor skill, in this case, the removal of staples using an aseptic technique. The evaluation and development of skilled clinical practice have been identified as a core aspect of nurse education.[4] Without doubt, clinical psychomotor skill mastery is essential for healthcare practitioners today.

The POV video glasses consist of a wearable camera mounted into a pair of fashionable sunglasses (with removable tinted lenses). These rechargeable glasses have a 2-GB internal memory and a removable micro SD card to enable video and audio playback via USB. They are portable,

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inexpensive, unobtrusive, lightweight, and easy for the operator to use.[5]

The students used the POV glasses (often referred to by the students as "spy glasses") as a simple method to record their performance of a clinical skill. The POV glasses have the capability to play back students' recordings on students own personal laptops or computers. Students can then critically analyze their individual recordings to gain an insight into their clinical psychomotor skill performance. Clinical facilitators can also view the video recordings and provide constructive feedback to the students about their skill development. The literature suggests that the use and review of video recordings and analysis by students have the potential to engage them in the autonomy of self-assessment, allowing for higher-order thinking and reflection on their performance.[6] Skills developed through self-assessment such as critical thinking and problem solving are essential in contemporary nurse education.[7]

REVIEW OF THE LITERATURE

Prior to introducing the POV video glasses, a review of the literature was undertaken exploring wearable technologies and the educational use of video recording in teaching and learning. Point of View video glasses can be classified as wearable technology. The review included a search of CINAHL, MEDLINE, and ERIC databases. The search was conducted using a number of key words. These included *wearable computing technology*, *video recording and analysis*, and *usability*.

Wearable Computing Technology

The literature suggests that wearable technology refers to devices that can be worn by users; this can range from accessories such as jewelry, sunglasses, a backpack, or even actual items of clothing such as shoes or a jacket. One of the main benefits of wearable technology is that it can conveniently integrate tools, devices, power needs, and connectivity within a user's everyday life and movements.[8] Wearable technologies are portable and lightweight and often take the place of an accessory that the user already wears, such as a t-shirt, glasses, or wristwatch, making them easy to take anywhere. Wearable computing has been identified as a major influence in the current downsizing of computers and sensory devices as well as allowing individuals to wear such technologies in a manner similar to clothes.[9] Researchers acknowledge that one major direction for wearable computing research is to intelligently assist in daily life, wherever a user chooses to go.[9] Historically, one of the first forays into wearable technology was in the 1980s, with the introduction of the calculator watch. It is suggested that the overarching theme behind wearable technology is convenience.[8]

The concept of a gesture pendant (Georgia Tech Broadband Institute, Atlanta, GA), a device worn as a necklace and consisting of a ring of infrared LEDs and a central black-and-white camera, was explored in 2000.[10] The gesture pendant could detect various hand motions made in front of it by sensing the infrared light reflected off the user's hand. Prior to this development, the StartleCam system was introduced (MIT Media Lab, Cambridge, MA). This uses a body-attached camera to capture the user's frontal view image when a user is startled.[11] However, neither the gesture pendant nor the StartleCam systems considered the user's head motion. In response to this, a head-mounted camera to record images from the user's viewpoint was developed.[9] More recently, the introduction of the GO-PRO (GoPro Inc, San Mateo, CA) head-mounted camera has taken technology to the high street. The GO-PRO camera is a fixed-focus camera measuring just $42 \times 60 \times 30$ mm. Although the camera has no viewfinder or LCD screen, its small form factor combined with a standard waterproof enclosure has made it popular with sports enthusiasts.[12]

A number of problems with head-mounted cameras recording video have been documented. It is suggested that they can cause fatigue to the wearer in relation to their weight, and because of their conspicuous appearance, the visual impact on others makes them difficult to use in daily life.[9] It is desirable for a head-mounted system to have high usability with low visual impact.[9]

Currently, a number of new wearable devices are coming onto the market that are outpacing the implementation of the innovative POV technology in the tertiary sector, that is, Google glasses being trialled to support breast-feeding mothers.[13]

Video Recording and Analysis

The process, benefits, and limitations of nursing students using video analysis have been identified and include an increased opportunity for skill practice, validation of performance, enhanced confidence with skill performance, and assertiveness in seeking out opportunities to perform the learned skill in the clinical setting.[14] Video analysis has also been used by medical students to self-assess their own communication skills. By reviewing videos of themselves with simulated patients, students were able to identify their own strengths and weaknesses based on the evidence.[15,16] Other researchers also found that when medical students viewed videos of themselves performing clinical skills their skills improved.[17]

The acquisition of clinical competencies in a given situation is a gradual process; therefore, the use of technologies in teaching nursing has contributed to the development of clinical skills.[15]

A key aspect of the benefits for faculty when videotaping students' skill performance is the flexibility and reduction in overall time spent in assessing the skill performance per student.[18]

Usability

Holden and Rada[3] explored the concept of usability and determined that it is crucial to the diffusion of new technologies that users are able to operate technology effectively, efficiently, and satisfactorily. Shackel[19] described usability as a system's capability to be used by humans effectively and easily. He also acknowledged that for a system to be acceptable it must satisfy the users' requirements for utility, usability, and cost. Dillon[20] sees usability as a measure of interface quality that refers to the effectiveness, efficiency, and satisfaction with which users can perform tasks with a tool. The literature suggests that testing an application can be performed in a number of ways, with the simplest being allowing a sample of users performing a set of predetermined tasks; this method is seen to be the most reliable and valid estimate of an application's usability. Dillon[20] suggests that following the completion of a task users are often asked to provide data on likes and dislikes through a survey or interview; this may be to evaluate their own performance and perceptions of the technology. Within the educational arena, many researchers concur with Shudong and Higgins'[21] claim that the technology is not yet up to the standard required for educational needs. Although they highlight limitations with mobile phone use in education, these may also be relevant to other educational technologies, including POV glasses.

Introducing the POV Video Glasses

The overall aim of introducing this educational innovation was to see if using the POV glasses in the simulated clinical skills laboratories would improve nursing students' clinical psychomotor skills, in particular, whether these recordings and video playback would add value to students' learning and promote their self-assessment skills and whether they were easy to use. Ethical approval for the qualitative study exploring students' reflections on using the POV glasses was granted by the human research ethics committee at the university where the study took place (Figure 1).

Students were required to record their performance of the clinical skill (the removal of staples using an aseptic technique) using the POV glasses and then review their video footage in order to promote self-assessment.

In addition, a short instructional Photo Story 3 (Microsoft, Redmond, WA) was developed demonstrating how to operate the POV glasses. This resource was uploaded onto the University Learning Management System, Moodle (LMS, Moodle Pty Ltd [AU]), site so that students could refer back to the operating instructions.

Prior to commencing the session, all the POV glasses were fully charged and loaded with a SD card. Of the small cohort of nursing students undertaking the master of nursing science (MScN entry to practice degree), 12 (n = 12) agreed to participate in the study to share their reflections of

FIGURE 1. Point of View glasses.

using the POV glasses by answering three open-ended questions through an online form. The students were asked to take some time to think about using the POV glasses for video playback and analysis as part of their self-assessment of their performance of staple removal using an aseptic technique. The questions asked were the following:

1. How did you find the experience?
2. How did it affect your learning of the skill?
3. Any other comments?

Open-ended responses to these questions were analyzed for meaning, categorized, and clustered into themes.[22] For example, some comments were categorized into positioning problems or technical issues, which were then included under the usability theme (Figure 2).

The themes identified from the responses are used to convey the nursing students' perspectives when using the POVs.[22] The three themes are usability, added value to learning, and promotion of self-assessment skills.

The Themes

USABILITY

Initially, students did not find wearing the glasses obtrusive or cumbersome; this may have been due to students previously having practiced their clinical skills while using safety glasses. Students soon became unaware of the glasses in place, with one student acknowledging:

> Wearing the glasses was not a problem at all!

However, a couple of students commented on difficulties encountered with using the glasses:

> The glasses needed to be positioned at a certain angle to capture the video of them undertaking the skill.

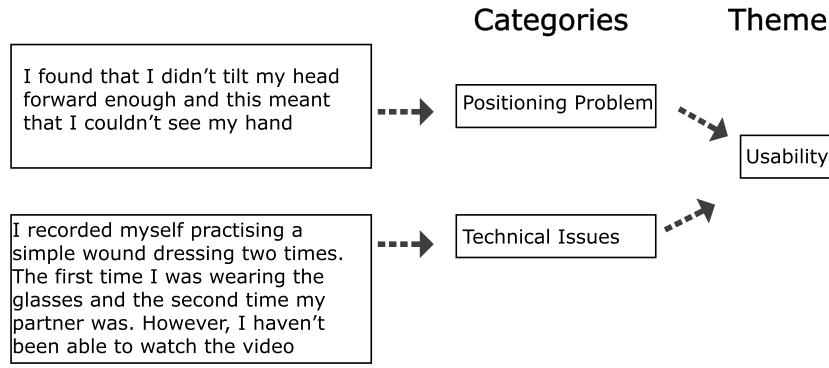

FIGURE 2. Example of comments, category, and theme.

> I recorded myself practising the skill a couple of times and tried it with my partner wearing the glasses.

The quality of the sound and vision recorded was also an aspect of usability identified by students. Students commented on the quality of the sound, with one student suggesting:

> I could hear myself really well!

Another student also commented on the usefulness of the visual recording:

> It helped me see what I was doing, and I was able to assess myself.

ADDED VALUE TO LEARNING

Students' reflective comments about using the POV glasses revealed that half of the students (n = 6, 50%) felt that using only the glasses had helped them to be more aware of what they were doing. Comments from students indicate this awareness:

> Some of the footage of the technique that was captured did highlight certain aspects of the technique that I wasn't aware of. For example, I did pick up on the video that the sterile side of the sheet inside the dressing pack touched the top horizontal bar on the trolley. This means that the site would then become contaminated.

> It made me try to do the correct steps every time and verbalize my action when doing things.

> The experience was good for learning because I was able to pick up on mistakes I would not have noticed otherwise.

> I noticed that only wearing the glasses made me more aware of what I was doing, and I avoided doing unnecessary things of pausing too long.

> Before I practiced dressing at home, I once looked at my recorded video from the laboratory and found out my mistakes. That helped me to learn the sequence of aseptic technique faster than if I wanted to follow my book. Thus, my learning process was faster.

> Being able to rewatch my performance made me learn the skill more quickly. It also made it easy to see what areas of aseptic technique I was unsure of as I could vocalize it on the video.

PROMOTING SELF-ASSESSMENT

Some students felt that through reviewing the video from the POV glasses they were able to identify their mistakes to help them improve their skills and in addition promoted reflection on their learning. The following comments highlight this visual reflection on learning:

> It made our learning easy; I would say it is our visual reflection.

> The experience was good for learning because I was able to pick up on mistakes I would not have noticed otherwise.

> It helps us in number of ways: (1) we can easily catch our mistakes and can improve them in future; (2) it makes our learning easy; I would say it is our visual reflection.

Lessons Learned

The nursing students' comments suggest that they found the POV glasses easy to wear and that they were able to hear themselves clearly, even when the visual recording was of a poor quality. There was certainly an increased awareness of students' own psychomotor skills. This supports previous research findings regarding the value of using video recording and analysis to improve student learning.[23] From the analysis of the students' responses in this study, students identified an increased awareness in their psychomotor skill development.

Earlier research findings indicate that reflection and self-assessment have been shown to be essential components of building clinical skills.[24] In this study, correcting poor practice was also identified by the nursing students as a valuable aspect of using the POV glasses in clinical skill development. Students found that reviewing the footage was a visual reminder of their performance that enabled them to see aspects of the skill that they would not have previously identified (such as touching the sterile field). Again, this is consistent with earlier research that suggests that self-assessment using video recording and analysis offers a way to promote self-awareness and self-evaluation of both positive and negative behaviors and to improve self-efficacy of students.[25]

The notion of being watched was another aspect of using video recording and playback identified by the participants

in this study as a useful consequence of using the POV glasses, with one student suggesting it created an environment similar to an examination setting, thus introducing a third dimension into the analysis of the video recording and playback.

However, a usability issue was encountered by students related to the position of the camera on the glasses, which is in the center of the bridge of the glasses. This often required the students to reposition their heads when undertaking a close-up recording of the clinical skill. In order to rectify this, students made a number of suggestions including repositioning the glasses further down the nose and having another person wear the glasses to video them performing the skill.

CONCLUSION

Using video recording and playback through wearable technology such as the POV glasses was seen by the students in this study as a strategy that could be used to improve their learning of a clinical skill. Some students found the glasses easy to wear and throughout their practice session even forgot they were using the POV glasses. For others, however, the actual process of knowingly wearing the glasses made them more self-aware of their practice. Although the visual quality was sometimes poor, students unanimously identified that using the POV glasses to record and later watch the video playback of the clinical skill accelerated their learning. In addition, the use of video recording through wearable technology as well as the playback and analysis of video may offer an effective way to communicate and educate other healthcare providers. It may also reduce the time that faculty spend on teaching psychomotor skills, while encouraging students to undertake self-assessment of clinical skills.

The authors conclude that further research is needed to evaluate the effectiveness of wearable video technologies and their use in promoting reflection and self-assessment about the performance of clinical skills.

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