Learning Paramedic Science Skills From a First Person Point of View

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Abstract: Paramedic students need to acquire knowledge and skills necessary to perform basic as well as complex clinical skills, to ensure patient safety, and to manage sophisticated equipment. Time and resource pressures on students, teaching staff and institutions have led health professional educators to develop and embrace alternative opportunities such as simulation and multimedia in order to develop a student's clinical expertise in preparation for clinical placement. Paramedic education laboratories are equipped with simulation equipment to facilitate the acquisition of the psychomotor skills required by paramedics, and are the main spaces where students can practice essential paramedic skills in a non-threatening environment. However, often the learning environment is encumbered by 'noise' or obstacles such as the educator's body, or ambient noise from other students, staff or equipment, all which inhibit a clear and precise view of the intricate details of skills to be learned. This study addressed the crowded laboratory and 'noise' issues through the use of video learning resources. Though using video as a learning resource is not new, there are three facets to learning that make this project innovative and beneficial to the learner; one, learning from a video composed from a first person point of view (1st PPOV); two, the viewing of the video learning materials using a mobile device such as a smart phone; and three, the use of QR codes to access the online videos. Six 1st PPOV video vignettes were produced for this study. Each video was less than two minutes and length, clear and instructional on selected psychomotor clinjcal skills required for acute care provision . The research findings show that the 1st PPOV videos positively impacted students' (n=87) learning of the six skills, and gave them a more comprehensive view and understanding of the skill in context. The findings also indicated that accessing the videos on a mobile phone was a bonus. The participants requested additional 1st PPOV skills to be included in the blended learning design across all areas of their Paramedic Science program.

Keywords: first person point of view, learning in the first person, paramedic science, paramedic science skills, skill acquisition, experiential learning, video learning materials

1. Introduction

Paramedics skills are life saving skills - however, it is often difficult to acquire these skills. Viewing and learning these skills using videos that are taken from a first person point of view, and viewing them when and where you need them, is important to all (Fukkink, Trienekens, & Kramer, 2010).

A groundbreaking report into paramedic education (Willis, Pointon, & O'Meara, 2009) identified three improvements to curriculum development and delivery. First, a critical need for low cost student-centred ways of teaching clinical skills. Second, a defined signature pedagogy in paramedic education. Third, inter-disciplinary education for paramedic students as paramedic graduates need to be competent in interdisciplinary team work and to function as first line public health/health promotion responders in pandemic situations (Tippett et al., 2008). All of these issues were addressed during the project reported in this paper.

While the literature posits that clinical skills training is critical and that video training is a promising area (Pea, 2006; Fukkink, et al., 2010; van Det et al., 2011; Xiao et al., 2007), there is a lack of information regarding the blending and use of simulation and videos from a first person point of view. Thus the aim of the study was to evaluate the perceived effectiveness of videos recorded from a first person point of view for paramedic clinical skills development. The study has two phases; the development of prototype video vignettes using a first person point of view together with evidence to guide and support the development of further vignettes, and stage two, the development of an extensive set of video vignettes together with an evaluation of their use in the simulated classroom or in situ. It is the initial findings from stage one that are reported in this paper.

2. Background

Paramedic students need to acquire knowledge and skills necessary to perform basic and complex paramedic skills, assure patient safety, and manage sophisticated equipment (for example, Deakin,

King, & Thompson, 2009; Butchart, Tjen, Garg, & Young, 2011). Demands for accountability, increased patient acuity levels, scarce quality clinical placements, and increased enrolments in professional programs have led health professionals to embrace alternative opportunities such as simulation and multimedia artefacts to develop a student's clinical expertise. A wide range of teaching materials are available for students in health sciences, including paramedic science. However, most of them are in traditional formats such as textbooks and tutorial workbooks (which are only partially engaging by their nature). An analysis of the literature indicates that the use of video is seen as having the potential to transform learning, in health sciences (Kim et al., 2010; Williams et al., 2010).

Paramedic education laboratories improve authenticity of the learning design, which reinforces clinical concepts and supports clinical practice in a safe and non-threatening environment (Boyle, Williams, & Burgess, 2007). These laboratories are equipped with simulation equipment that "can enhance learning and provides a stimulating environment" (Starkweather & Kardong-Edgren, 2008, p. 1), facilitate the acquisition of the psychomotor skills required by paramedics, and allows a place where they can practice these skills in a non-threatening environment. In paramedic training, simulation and videos have been used in relationship to training for example, general clinical skills, drug administration, continuing education, and disaster management.

Furthermore, with opportunities for just-in-time learning that have been brought about by technological advances such as the 'smart' mobile phone, learning and re-learning at the bedside of a patient is a common approach taken in nursing education (Waldner & Olson, 2007). The 2012 Horizon Report identifies that mobile devices (smart phones and tablets) are expected to enter the mainstream of higher education within the year (or less) (NMC Horizon Report, 2012). Mobile learning opportunities could help students arrive in the clinical setting better prepared and with greater confidence (Jeffries, 2005). However, often the learning environment is encumbered by obstacles such as the educator's body, ambient noise from other students, staff or equipment, all which inhibit a clear and precise view of the intricate skill to be learned. Reviewing a video presented on a mobile phone of a skill composed in the first person could overcome these obstacles.

3. Research questions

The literature review, academic need and industry insight underpinned the following research questions:

- To what extent do short videos of intricate paramedic clinical skills filmed from a first person view are perceived to enhance learning?
- What value to the learner is the ability to view a first person learning object on a mobile device?

4. Research design

This project was conducted following a design-based research methodology using mixed data collection and analysis methods. This methodology was selected as it "improve[s] educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings" (Wang & Hannafin, 2005 p.6).

Design-based research usually entails a continuous cycle of design, enactment, analysis, and redesign (Collins, 1992). This approach was deemed suitable for the project as its iterative nature would determine what learning objects were required according to the study participants and the literature, refining the learning objects themselves, and evaluation of their use. The interpretative approach used to explore the data collected enabled the researchers to "learn what is meaningful or relevant to the people being studied" (Neuman, 2000 p71).

Research projects that adopt the design-based methodology typically involve both the design of certain forms of educational interventions based on a particular theoretical framework and systematically studying these forms in context, in order to better understand the various issues that target domain specific learning processes (Cobb, et al, 2003). The intervention used in this study was presenting students with short videos of an expert performing basic paramedic clinical skills filmed from a first person point of view. The theoretical framework underpinning the study is that of experiential learning.

4.1 Experiential learning

Chee (2001) argues that learning needs to be embedded or 'rooted' in experience (p43); or 'experiential learning'. Experiential learning is well recognised by educators as a rewarding student-centred learning approach. Virtual reality, simulations and merged or concoctions of both, together with advances in information and communication technologies, have opened up numerous technology rich avenues for experiential learning. However, as argued by Roschelle (2003), Herrington and Kervin (2007) and others, technology needs to be underpinned by "theoretically [pedagogically] sound ways" (Herrington & Kervin 2007 p219). Technology on its own does not make for a good and valuable learning experience for the learner. Pedagogy and curriculum play crucial roles in education, and need to be seriously considered when developing a technology-rich experiential learning experience.

A number of adult learning principles from theories by such thinkers as Malcolm Knowles (1950) and Carl Rogers (1961), were used to inform the design and deployment of the project.

4.1.1 First person point of view

First person point of view (1st PPOV) is commonly used in computer games to engage the 'player' to participate first hand in the action of what is happening. It is commonly used in 'shoot them up' and adventure games. Objects created using this point of view can show a realistic perspective as the learner sees what they would see if they were actually doing the action themselves, with the resultant experience becoming either authentic or experiential. The study presented here implements 1st PPOV in learning objects where the user engages in direct interaction with the elements of a simulated environment; the environment in this study being a simulated paramedic skills experience.

Simulated learning experiences can provide students in a given cohort with opportunities to develop specific clinical skills, as well as supporting clinical decision making and the development of critical thinking skills in a safe and controlled environment. As more sophisticated resources for simulation-based learning become available, students will have opportunities to learn through multi-sensory patient care scenarios requiring demonstration of cognitive, psychosocial and psychomotor skills. These opportunities will help students arrive in the clinical setting better prepared and with greater confidence (Jeffries, 2005).

4.1.2 Time and place for learning

Wireless mobile learning devices have the potential to achieve large-scale impact on learning because of their portability, low cost, and variety in communication features (Rochelle 2003). The argument is how to make the best educationally sound use of mobile devices? Modern telecommunication systems, in particular, mobile telecommunication, can aid in delivering this content to the learner in situ. In the paramedic laboratory/lecture setting (as well as in other skills training situations), it could be beneficial to view skill training artefacts at a time and place paramedics require further instruction or a refresher. This concept is supported in general by researchers such as Rochelle 2003; Lehner, F., N sekabel, H., and Lehmann (2003); and Liang et al., 2005; and in the health arena in particular by Fisher, et al. 2006; Lai, et al. 2007; and Lynch, et al. 2010.

The nature of mobile devices encourages their use in personal spaces, such as in the case of our proposed project, clinical practice or personal revision of a skill, and as such they can be used for reinforcement by an individual, or if the device is 'passed around' cooperative learning can take place. Lai et al (2007) claim that "mobile technologies are effective in improving knowledge creation during experiential learning" (p326); experiential learning is the learning principle of choice in western education today. The use of mobile devices in education can "assist active knowledge acquisition by the learner" (Lehner, N sekabel & Lehmann 2003 p25) and "they provide 'just enough, just for me, just in time' learning" (Taylor et al., 2011, p180).

Studies on the use of mobile devices in the nursing setting have been undertaken, where they have been found to be an effective resource for students, especially for reference materials(Miller et al., 2005). Other studies demonstrated that the benefits of m-learning for student nurses were improved lecturer and peer support, better access to information and resources, and the ability to record and reflect on their clinical experiences in real time (Dearnley & Matthew, 2007; Taylor, Coates, Eastburn, & Ellis, 2006).

Given the perceived value of mobile communications for learning, it was decided to develop the projects learning objects in formats that could be viewed on a mobile device such as a 'smartphone' or tablet computer.

4.2 Developing the 1st PPOV videos

Analysis of the case institution's paramedic curriculum and local practice were undertaken to identify an initial list of skills that are critical to the skills development of student paramedics. Additionally, an exploration for external resources was conducted so as to not to duplicate what already existed, and to identify existing resources that were of poor quality or inappropriate.

The skills selected were:

- Check an airway
- Triple airway manoeuvrer
- Nasopharyngeal insertion
- OP Airway insertion
- Ventilation BVM
- Yankaeur suction

Script outlines were formulated for each skill, taking into consideration that an ad hoc, first person think aloud style was the best approach (Lynch et al 2010). The scripts were reviewed by peers for accuracy and thoroughness.

Filming the videos was undertaken in a simulation laboratory using real paramedics and human patients or mannequins. A mannequin was only used when the skill involved an invasive procedure, as previous research conducted by Lynch et al (2010) showed that using a human rather than a mannequin made the experience more authentic to the learner. The video equipment used was a head mounted camera with inbuilt audio.

Once the videos were peer reviewed for accuracy and thoroughness, they were clipped to delete unnecessary frames, branded, and saved in mp4 format.

Dissemination of the videos was through the University's learning management system and YouTube (see **Figure 1**). The YouTube urls were displayed as QR codes in the paramedic laboratory.

Figure 1: YouTube

4.3 Methods and procedures

A mixed methods research approach was used for collecting and analysing data. An online survey was developed and accessed via the learning management system; there were 87 usable responses (an overall response rate of 66%). The study was conducted at an Australian tertiary education institution in a paramedic course that includes both first year (52% response rate) and second year (83% response rate) students.

4.3.1 The survey

The survey contained quantitative questions to collect data so as to create a profile of the respondents; including questions such as the number of semesters completed, study mode, and device ownership. The survey also asked where (from a given list) did they accessed the videos. There were 11 Likert scale questions relating to students' perceptions as to learning the skills from the videos; their preferences for video length, content and place of access. The survey allowed for open ended comments, as well as specific questions requiring a textual response such as suggestions for improvement, perceived impact on learning, and perceived barriers and facilitators to learning using videos from a 1st PPOV.

4.3.2 Analysis

The quantitative data was analysed using the assistance of SPSS (Statistical Package for the Social Sciences) allowing for preliminary findings to be drawn from the data that then could be used as a basis for a more extensive study. Qualitative data used a thematic approach, and coded the responses according to derived themes.

5. Results

The respondents were evenly spread between first and second year students study paramedic science primarily studying full-time at the case Australian university. Over half of the respondents owned a smartphone (see **Table 1**).

Table 1: Profile of respondents

Question	n=87	Percentage (%)
Two semesters studied	44	50.6%
Three or more semesters studied	43	49.4%
Full time status	85	97.7%
Own a smartphone owned	56	64.4%
Own a tablet PC	16	18.4%

n= number of valid responses

The participants were asked from where they actually access the videos. The results are presented according to the year level of the students in **Figure 2** and **Error! Reference source not found.**). It was found that they accessed the videos mostly from their home computer, followed by the university paramedic laboratory, a mobile phone, then through the use of the QR code.

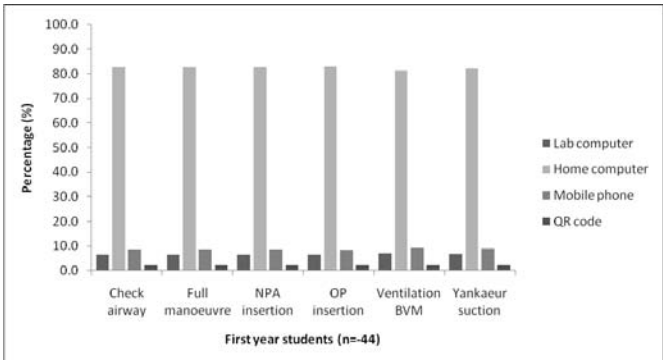

Figure 2: 1st year students actual access to the first-person clinical skill videos

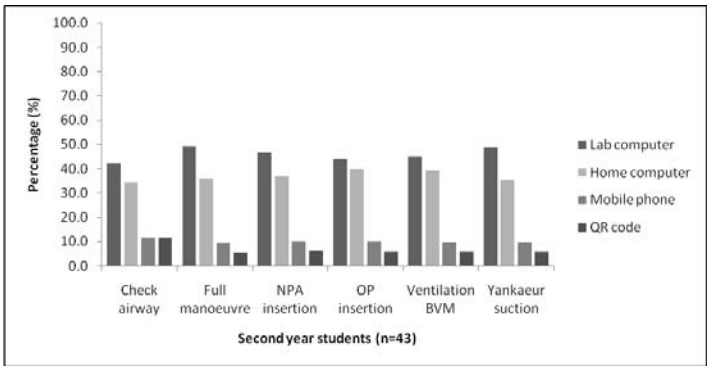

Figure 3: 2nd year students actual access to the first-person clinical skill videos

Further, data was collected on the most likely ways they access the videos (rather thant he ways in which they actually accessed them – as presented above). Students were asked to rank the location of access from the most likely (1) to the least likely (8). Answers were aggregated into a relative score using the following scoring system: a first preference is worth 1.0, a second preference worth 0.875, a third preference is worth 0.750 etc, decreasing in intervals of 0.125. Preference point totals for each medium were multiplied by their respective fractional value, and then added to produce a total score. Therefore, a selection that contains predominantly second preferences could still achieve a higher score overall than a selection containing many 1st and 8th preferences. In this way, every vote counts to produce a more accurate overall representation of everyone's preference. (see **Error! Reference source not found.**).

Table 2:

Q 18 – Where would you most likely access the videos?								
	Mobile	Mob Lab	P Lab PC	Lab PC	PD LT	P Home	Mob Case	Other
1st year	4th	6th	3rd	2nd	5th	1st	7th	8th
Relative Score	45.9	36.4	51.8	52.0	41.7	76.2	29.1	10.5
2nd year	3rd	4 th	2nd	5th	6th	1ST	7th	8th
Relative Score	50.2	49.7	58.1	44.6	37.9	67.6	24.8	6.4
Year 1 & 2 combined ranking	4 th	5 th	2nd	3rd	6th	1st	7th	8th
Relative Score	48	42.9	54.9	48.4	39.9	72	27	8.5

The format of the videos is an important access and equity related feature. The students were asked to select the most likely format of accessing the videos. The options were; an external video hosting service where the transfer load is debited from student's data download use account, for example YouTube; streamed through the university's infrastructure thus being debited from a student's Internet use allocation if one campus, or other if off cmapus; or as a downloadable file so that the file can be re-viewed without further Internet use charges (see **Figure 4**; the figures used are percentages of participant responses, and is categories according to year of study).

Further, the survey asked the respondents to indicate their level of agreement (1= Strongly disagree; 5 – Strongly agree) to eleven statements in an endeavour to elicit their perceptions as to the value of the videos for learning (see Table 3). The aggregated data are found in **Figure 5**.

Open ended questions asked for comments regarding the students' perceptions the impact the 1st PPOV videos would have on the acquisition of the skills. The overwhelming response was related to the POV videos improving the learning of skills by the student. The use of the videos for revision, and the request to have them available earlier on in the degree (and more of them) were the next most common comments. Figure 6 presents these themes as a word mashup; the larger the font the greater the number of occurrences of the comment or theme.

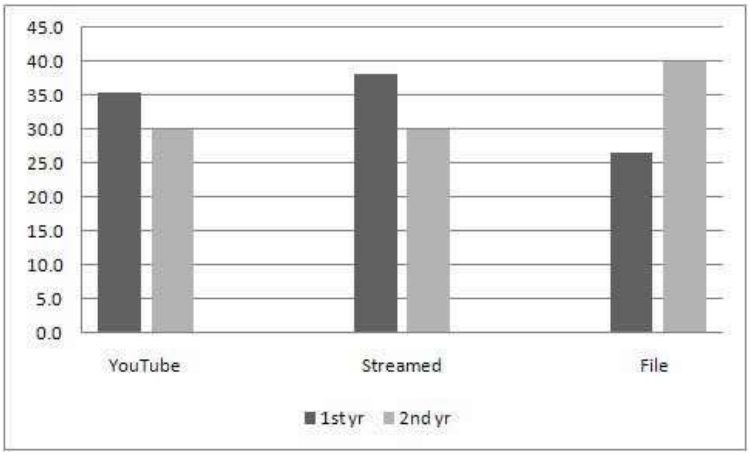

Figure 4: Format and access preferences

Table 3: Questions relating to the students' perceptions of the value of the videos to their learning

Q6. The 1st PPOV videos could be very beneficial for student learning	Q11. Using the 1st PPOV videos for learning clinical skills will take up too much of my time
Q7. The 1st PPOV videos would be of greatest benefit to students if they were used at the very beginning in a paramedic course	Q12. Using the 1st PPOV videos are more efficient use of my time than traditional learning materials (i.e. textbooks)
Q8. The 1st PPOV videos would be of greatest benefit to students if they were used throughout the entire paramedic program	Q13. Using the 1st PPOV videos for learning paramedic clinical skills will increase my confidence in my ability to perform these skills
Q9. The 1st PPOV videos would be of greatest benefit to students if they were used in the learning of paramedic clinical skills	Q14. Using the 1st PPOV videos on how to complete an eARF would be valuable for my learning
Q10. Using the 1st PPOV videos will help me learn clinical skills faster	Q15. A 1st PPOV video that displays a systematic approach in the paramedic practice model would have a positive impact on student learning
	Q16. Using a 1st PPOV video showing the inside of an ambulance and the location of equipment would be valuable for my learning

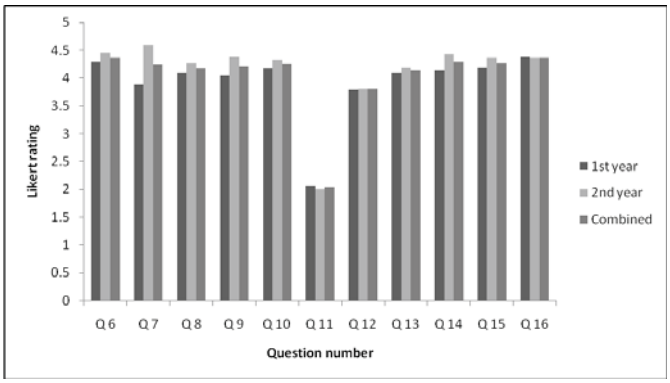

Figure 5: Aggregated responses relating to the students' perceptions of the value of the videos to their learning

Figure 6: Mashup of the most common themes found in the qualitative data

The videos were placed onto YouTube so that they could be accessed outside the Course web site thus not requiring a long in, and thus making them freely available to anyone (who found them). It is interesting to discover through the data logs available in You Tube, that links to the videos where being directed from not only the University web site, but also from Twitter, Facebook and Google; and access from countries other than Australia.

Over a five month period our most popular YouTube clip was the triple airway manoeuvre, followed by check airways, table / presents the number of total views and is ordered in most to least popular.

Order of popularity	Skill	No. of Views
1	Triple airway (full) manoeuvre	443
2	Check airway	415
3	Ventilation BVM	359
4	OP Airway insertion	353
5	Nasopharyngeal insertion	340
6	Yankaeur suction	338

The Triple airway (full) manoeuvre video was the fifth in the YouTube playlist, indicating that is position in the list was not its reason for its popularity. The video shows how the complete procedure is undertaken, which is what the students wanted to see; a flowing un-segmented sequence. The students indicated that they preferred the skills to be performed on a person rather than a mannequin; the triple airway manoeuvre was undertaken on a mannequin due to the intrusive nature of the full procedure, however. the students recognised this as unavoidable,

6. Discussion

With technology continuing to influence the delivery of education, and universities being required to develop more effective and flexible delivery strategies, web-enhanced blended learning environments are becoming universal. It is clear that teaching and learning approaches have moved away from simply transmitting information from lecturer/book to the learner, to more diverse approaches of teaching. The use of video learning materials to assist in learning skills has been used for many years, and there is no question, that in general, they can be a valuable learning and training resource. The project presented here moved two steps further in this use of video material for learning in that

the video material was produced from a first person point of view and made available in a format suitable for viewing using a mobile device.

The study addressed two research questions, the first relating to the use of first person videos to enhance learning; the second, the perceived value of the first person videos on a mobile device. These questions were answered through the collection of survey data obtained voluntary and anonymously from the first/second year cohort of paramedical science students at an Australian university (66% response rate).

A limitation of the study was the relative small sample size and the regional nature of the case university; however it is felt that a substantially larger sample size from a broader range of dispersed universities may not detect any additional insight.

6.1 Enhance learning

The research findings indicate the students' perceptions that the 1st PPOV videos will have a positive impact on their learning of the six skills under study, and provide them with a more comprehensive view and understanding of the skill in contextas a student summarised it below:

"Because I can read a textbook and go 'oh yeah' and then have absolutely no idea what I'm doing, but if you see it done, you're shown it and then you do it, and then if you do something wrong you can go back and look at it and see exactly where you went wrong... or where you went right."

Students requested additional skills to be included in the 1st PPOV learning design across all areas of their Paramedic Science program, requesting more 1st PPOV videos to be made available to them – and from the start of their learning of clinical skills. This adds additional support to the existing literature around use of video in health education (Kim, et al., 2010; Williams, et al., 2010; Cardoso et al., 2011) and encourages innovations using blended learning (Ruiz, Mintzer, & Leipzig, 2006; Williams, 2009). One of the unforeseen findings was the students' recognition that these skills, though they may become mechanical after some time, the skill performer continually goes through a deep cognitive process – each of which are specific to the situation at hand, every time they perform the skill. This insight into the psyche of the expert was deemed to be invaluable to their learning.

One important finding was that the duration of the videos needs to be as long as necessary but as short as possible. The videos under study were all planned to be less than 60 seconds – however some skills took a little longer due to their complex nature, no video was longer than two minutes in order to minimise the cost on students' time and Internet download charges, and to allow for fast review of the video if required. Future research could look at the best content coverage/time balance from the perspective of the students. In terms of content, the study only focused on the correct performance of the skills. Future developments may include suboptimal treatment as well in order to allow for critical discussion during practical sessions or during assessment.

1st PPOV video recordings could be used for multiple purposes: training, assessment, self-assessment, practice, skills review and more. A number of the student responses indicted that it would be valuable if skill 'tip sheets' were developed alongside each video to accommodate for those learners also like to read or would rather read instruction than view them. This multiple format is in line with good pedagogical practices.

Video production needs to be setup in a way that balances professional quality of the video with realism (one of the participant's commented was that a steadier footage would be desirable). It is important to note that video editing capabilities are desirable and that appropriate resources need to be dedicated to pre and post video production. The decreasing costs of video equipment and video editing suites make such endeavours more and more cost-effective.

A structured approach to the planning, implementation and evaluation has been used. Through team reflection the following success factors for the project have been identified: an analysis of the teaching and learning needs; defined objectives; attention to learning materials, resources and capacity required for successful production of learning materials; and a research project of sufficient size to allow for systematic evaluation.

6.2 Viewing on a mobile device

Over half (64.4%) of the survey respondents indicated that they had a 'smart' mobile phone, with a further 18.4 indicating a 'tablet' computer; each of these devices are capable of displaying the videos produced on a mobile-internet enabled device. However, the access penetration of a mobile device was relatively insignificant (around 10%) even though the comment was made by many participants that accessing the videos in such a way was useful.

This miss match could be due to the students not having the knowledge of how to access the content using a mobile phone. It needs to be noted, the urls for the videos were available as QR codes, however very few students knew how to read and execute the QR code on their phone. Further, the complex nature of YouTube urls, are probable factors in the lack of actual access on a mobile device, however, the participants made comment as to the benefits of doing so. Regardless, accessing the videos using a mobile phone was ranked fourth (out of 8) overall.

7. Conclusion

Six short videos of paramedic clinical skills were developed by an interdisciplinary team and evaluated in terms of learning with positive results by a student cohort. The use of first person point of view videos was perceived by students to enhance their learning of clinical skills as viewing how to do these skills through the eyes of an expert was authentic and immersive. Furthermore, having videos of these skills that were accessible anywhere at any time was seen as a very valuable learning resource.

In an endeavour to guide further development and research, an evaluation of the 1st PPOV video learning materials included assessment of outcomes such as usability of content, learner satisfaction and learner input.

The findings suggest that learning videos filmed from a first person point of view, using people (and mannequins only where appropriate), stepped as well as a completed sequence, and available as a downloadable file as well as streamed, will engage the learner, improve skills understanding and acquisition, be valuable for revision and retention, and enhance learning. Accessing these videos using a mobile device was seen as beneficial; however, this aspect needs to be investigated further.

It is evident that additional investment and research in the learning of paramedic clinical skills using first person point of view video learning materials needs to continue. As such the research team is developing more video materials from a 1st PPOV – the skills of which are drawn from the suggestions in the survey responses, as well as introducing the materials into the curriculum from the beginning of the paramedic science program.

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