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A Simulation Pedagogical Approach to Engaging Generalist Pre-service Teachers in Physical Education Online: The GoPro Trial 1.0

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Abstract: There has been a continuous increase in enrolments within teacher education programs in recent years delivered via online and external modes. Such levels of enrolment have raised discussion around the theory-practice nexus and whether pre-service teachers (PSTs) can optimally engage with practical learning components via online platforms. This paper provides insight into the potential and feasibility of using GoPro video technology as an innovation in online teacher education delivery of practical physical education (PE) classes. Upon completion of the university semester, qualitative data was collected detailing the generalist PSTs' perceptions relating to the potential of using GoPro video footage to capture practical PE classes. Field note observations also documented implementation considerations for integrating GoPro technology into practical PE lessons. The findings from the GoPro trial provide valuable insight for teacher education providers for future planning and delivery of university practical PE classes online.

Introduction

There are approximately 165 million people enrolled in higher education study worldwide (Marope, Wells, & Hazelkorn, 2013) which is predicted to increase by another 98 million enrolments over the next 10 years (Maslen, 2012). With such an expanding higher education market, universities are continuously implementing strategies to optimally educate such high enrolments by teaching effectively (Marope et al., 2013). Entering higher education programs are students termed 'Millenials', 'NextGen'ers', 'Digital natives' or 'Generation Y' of the next generation that were born after 1982 (Oblinger, 2004). Such students have preferences towards using technology (Oblinger, 2004) as they were born when the personal computer was introduced; a high percentage of our society in the first world owns computers and immersion in digital media has been a natural part of their environment (Oblinger, 2004). To accommodate such booming enrolments and to engage students that are 'digital natives' universities are expanding their delivery of courses that are delivered online.

Most students when they enrol in online learning classes are unable to attend on-campus classes or they are looking for learning 'convenience' and 'flexibility' (Garrison & Kanuka, 2004). Not managed properly, students' learning online can have reduced social, academic and skill development opportunities compared to those learning via traditional face-to-face classes (Kim & Bonk, 2006). As online courses become more popular, teachers are trying to find new ways to incorporate learning resources and forms of learning support into their classes (Kim & Bonk, 2006). Although opportunities for teachers and students to interact is present within online courses, an online education environment has greater limitation in reproducing the same depth of interactions that occur face-to-face, especially in

'action-packed' practical classes such as in physical education (PE) (McMahon & Dinan-Thompson, 2014).

Simulation pedagogy is one such method that can reproduce strong interactions that occur within practical PE classes. Simulations are described as providing teaching and learning experiences that imitate the appearances and characteristics of more real life experiences (Murray, Grant, Howarth, & Leigh, 2008). Alternatively, simulations are described as an environment that is developed to enhance an individual's engagement with real experiences (Bell, Kanar, & Kozlowski, 2008) that in turn can develop skills and learning objectives (Cook & Swift, 2006; Lane, 1995). Simulated teaching pedagogy has previously been utilised in higher education through platforms such as:

- 'Voki' (a talking on-screen figure utilised to simulate instructions) (Anderson, Page, & Wendorf, 2013);
- 'SecondLife' (a 3D virtual world where users can socialise, connect, create and learn using free voice and text chat) (Warburton, 2009) and;
- 'Electronic gaming' (use of games to solve complex learning situations) (Liu, Cheng, & Huang, 2011).

Despite these platforms to enhance the simulated learning experiences of higher education students across a number of disciplines such as medicine and science education (Cardoso et al., 2012; Frøyland, Remmen, Mork, Ødegaard, & Christiansen, 2015; Kelly et al., 2009; Kindt, 2011; Metcalfe, Jonas-Dwyer, Saunders, & Dugmore, 2015; Roshier et al., 2011), providing simulating experiences that mimic 'authentic' traditional classroom practical experiences in PE has often been overlooked. The practical nature of the discipline and limited access to practical activities for students learning externally, especially from remote locations underscores the importance of simulated pedagogy within practical PE classes.

Video Capture to Promote Simulated Learning Experiences for Pre-service Teachers

There are many benefits to using high quality videos as education resources for teaching by linking to theory, practice, simulation of deeper learning, promoting critical reflection and enhancing class engagement (Lau & Roeser, 2002; Lynch, McNamara, & Seery, 2012; Roshier, Foster, & Jones, 2011). By allowing learning to be accessed over multiple occasions via recorded content, the replay capabilities of video content can provide an ability for students to self-direct their learning experiences (Kelly, Lyng, McGrath, & Cannon, 2009). Recorded video content of practical classes can allow students to access learning experiences in the comfort of their chosen environments, at a chosen time and at a chosen pace to increase student control of their learning experiences (Kelly et al., 2009). Similar to other professions such as medicine (Hibbert et al., 2013), viewing correct skill executions, peer interactions, demonstrations and role modelling of correct procedures provides an important form of learning. Simulating classroom experiences can ensure students are introduced to skills and techniques in the comfort of their own environments which can reduce anxiety of performing and demonstrating skills on the spot (Cardoso et al., 2012). Video footage of practical classes can provide a learning tool for students that provide deep information, a variety of content, can be easily accessed via online platforms and when accessed via mobile technology can be a convenient, engaging resource (Cardoso et al., 2012; Hibbert et al., 2013; Kelly et al., 2009; Lynch et al., 2012; Roshier et al., 2011).

The development of portable video devices has resulted in an increased capturing of simulated sporting and action-packed experiences (Chalfen, 2014; Skiba, 2014). Portable video devices can enable participants to create point of view capturing of complex practical

activities that captures realistic experiences in which viewers feel 'more part of the action' that is being undertaken (Chalfen, 2014). The promising nature of portable devices to positively influence the provision of online teacher education learning experiences is therefore significant. Not only can portable video devices capture the demonstration of skills of participants, it is possible to convey skills and interactions through the eyes of the class facilitators (e.g. teachers and lecturers) (Lynch et al., 2012). As online enrolments continue to increase and require learning of disciplines of a practical nature, there will be an appetite for the delivery of high quality learning content that is as close to the action or real life experiences as possible (Lynch et al., 2012; McAllister, Searl, & Davis, 2013).

How can we Simulate the Practical and Physical Nature of PE Classes for Externally Enrolled Pre-service Teachers?

The name Physical Education itself points to a subject of 'physical' nature. Australia's teacher education programs have a unique and important role to play in assisting pre-service teachers to deliver developmentally-appropriate PE classes to ensure graduate teachers can deliver content efficiently when entering the teaching profession (Hyndman, 2014; Hyndman & Pill, 2016). Physical education teachers need to be prepared to overcome challenges such as low levels of confidence in order to provide high quality planning of safe, structured and well managed lessons (DeCorby, Halas, Dixon, Wintrup, & Janzen, 2005; Morgan & Hansen, 2008). With the 'physical' nature of PE classes and a growing externally-focused teaching and learning environment (especially in tertiary education systems), providing real-life PE 'practical' experiences within an online environment can be challenging to facilitate for pre-service teachers (PSTs) (McMahon & Dinan-Thompson, 2014). Ensuring that PSTs can provide quality PE and are 'teaching ready' from the delivery of PE units are important considerations (McMahon & Dinan-Thompson, 2014).

Electronic avenues for learning have been reported to hold promise for PE (Papastergiou, 2009). In relation to practical PE, sport video games, via simulated footage of basketball, football, tennis and other sports has previously allowed students to virtually participate in athletic activities and can serve as an instructional resource (Kim & Hyungil, 2007). Over the past decade a new type of electronic gaming has emerged, 'exergames' involving physical activity as a means of interacting with the game (Lieberman, 2006). Within exergames, a range of physical activity devices are used such as bike ergometers, dance pads, motion platforms (e.g. to capture tennis, basketball and golf movements) and tracking cameras (Lieberman, 2006). This is compared to traditional electronic devices such as keyboards, mouse and joysticks (Lieberman, 2006). Such electronic avenues for learning have demonstrated improvements in PE engagement and physical activity participation (Lieberman, 2006; Papastergiou, 2009).

Although beginning to be used within medical professions and science education in higher education (Cardoso et al., 2012; Frøyland, Remmen, Mork, Ødegaard, & Christiansen, 2015; Kelly et al., 2009; Kindt, 2011; Metcalfe, Jonas-Dwyer, Saunders, & Dugmore, 2015; Roshier et al., 2011), there has been little reported use of simulation learning methods for those learning practical PE via online teacher education platforms. It is important for PSTs to have learning experiences based around managing the PE learning environment and development of content knowledge relating to movements skills that imitate the appearances, diverse physical activities and the characteristics of those that are able to attend classes on campus. Other important guidelines that simulated learning experiences can address include:

- The recent Australian Teacher Education Ministerial Advisory Group (TEMAG) recommendations of the use of innovative technology, providing strategies to improve

'classroom readiness' and the teaching delivery of pre-service teachers (TEMAG, 2015); and

- The Australian Institute for Teachers and School Leadership (AITSL) graduate teacher standards note the importance of applying innovative technology, implementing a variety of teaching strategies and engaging in professional learning to improve teaching practice (AITSL, 2011).

Although electronic gaming has emerged as a key learning format within university courses to simulate learning experiences (Kron, Gjerde, Sen, & Fetters, 2010), the use of portable video capturing devices can provide opportunities for online students to engage with PE practical experiences and improve PE teaching readiness. To date, the use of portable video footage has only been reported in the United States for evaluating the teaching delivery practices of PSTs in class (Baghurst, 2016). To our knowledge, there has been no investigation into the potential of utilising GoPro technology to simulate practical PE experiences for online learners within an Australian teacher education program. There is also an absence of insight from PSTs or guidance for physical educators into the procedures of facilitating simulation pedagogical experiences via GoPro technology.

Therefore, the aim of this study was to evaluate generalist PST perceptions relating to the potential of using GoPro video footage to capture practical PE classes for online learning. A secondary aim was to gauge the feasibility of implementing GoPro technology and capturing practical PE lesson footage for online learners.

The GoPro Technology Innovation

Compared to the traditional use of digital video cameras that have been used to record, evoke and enact experiences, GoPro video cameras are uniquely designed for 'action packed' practical experiences by enabling 'point of view' vision when attached to parts of the body in high definition (Wellard, 2015) (Figure 1). It has been reported that such wearable digital video cameras have strong potential for researching social worlds (Chalfen, 2014). Such emerging technology can record action experiences and provide possibilities to capture embodied, sensory, kinesthetic and emotional knowledge and experiences (Wellard, 2015). The video cameras not only capture high definition video, yet are also match box sized and built to withstand substantial force (as illustrated by Felix Baumgartner's 18,000 mile high 'Space Jump') (Redbull Inc., 2012). With the 'action packed' nature of PE practical teaching classes, such technology can provide externally enrolled PE students with access to simulated learning via 'point of view' angles that are important during the practical classes.

Figure 1: The GoPro Hero+ camera used within the study

Methods

Procedure

During week one of class, PSTs learning on-campus were provided with an opportunity to consent to the recordings being used to stream to online enrolled PSTs via youtube on the university's online learning platform (100% consent/response rate). The purpose was explained as being to capture learning experiences through 'a student's or teacher's eyes' and for PSTs to feel as though they were engaged in the practical class activities when learning online. The purposes of using the GoPro video footage included capturing what both the teacher and PST sees, hears, and says (teacher only) during the class. It was also important to evaluate the lighting, sound and positioning of the footage during planning stages to ensure that the video captured was as efficient as possible during teaching and learning.

With little investigation to our knowledge of GoPro equipment being utilised to enhance and simulate practical physical education delivery to externally enrolled generalist pre-service teachers, the GoPro Hero+ was ordered at the beginning of February, 2016 to ensure there was time for the researcher to familiarise with the equipment prior to delivery at the beginning of the first semester (March). The students were engaged in a process of weekly practical recordings over the semester within the teacher education unit.

Camera and Equipment

The simulated practical experiences were recorded with the assistance of a head strap mount (Figure 2) and a chest strap mount (Figure 3). The GoPro Hero+ Edition camera was used for its suitability to combine high quality video with mobility of use (GoPro, 2010). Affordability also played a role in selecting this camera. The main concern was ensuring the camera had the correct video format to ensure functionality by recording the performance of practical PE class activities from a first person point of view (teacher or student), suitable for video editing and later for uploading into YouTube. The High Definition (HD) standard resolution of 1080 (1,920 x 1,080) was applied to the video recording settings to ensure the practical activities could be optimally captured (GoPro, 2010). The GoPro was also operated by a Smartphone with a GoPro application to preview and control the camera (start/stop the camera).

Figure 2: The GoPro Head Mount

Figure 3: The GoPro Chest Mount

After GoPro Video Capture

A number of pieces of GoPro practical footage were uploaded and edited on Apple Mac computers using iMovie software in high definition (1080i) and saved in mp4 format. Video scenes were edited by the unit lecturer and a qualified research assistant that had a combined total of 20 years of teaching experience according to key instructional points, demonstrations, teaching moments and high level engagement during the practical activities. Peer talking during the activities was muted and sections where students were having a break from activities were deleted. Activity titles, graphic overlays and captions were added via the iMovie software to clarify the activity instructions and rules that were being delivered throughout the clips. The video editing assisted in ensuring that the most engaging learning footage was provided to the teacher education students and to ensure the video was able to be conveniently engaged with. Completed videos were then uploaded to Youtube and any shakiness was improved through the Youtube platform. The private video option was selected so that only students with access to the link could access the practical class simulated footage and the link was provided via the Blackboard online learning system for the unit.

Narrative Research Approach

Narrative research has been commonly used in studies of educational practices (Connelly & Clandinin, 1990) enabling methods of self discovery and knowing in PE PST education (McMahon & Penney, 2013). Narrative was the selected methodology for this research as it illustrates the PSTs' perceptions and enables the audience to access responses as they naturally occur. Narrative is described as any written or verbal representation (Polkinghorne, 1988; Riessman, 1993) and reflects the notion that "writing has to begin somewhere" (Holstein & Gubrium, 2012, p. 44). The PSTs' collective perceptions contribute to a final narrative product of an assemblage of voices, creating an "imposing a meaningful pattern" (Salmon & Riessman, 2008, p. 79). The use of narrative within this investigation allowed the examination of dialogue, commentaries and/or conversations (Gubrium & Holstein, 1999) relating to the potential of using the emerging GoPro technology to capture practical PE classes and simulate the classes for learning via online platforms.

Recruitment

After ethical approval was obtained from the university human research ethics committee, a total of 175 generalist PSTs enrolled online were invited to participate in the study and contacted by an independent third person (research assistant) at the end of the semester. Information about the project was outlined and the online PSTs were notified that

they would be required to complete an online survey to determine their perceptions of the potential of using GoPro technology to engage further with practical PE classes online. The independent third party handled any queries pertaining to their involvement in the study and the obtaining of consent. While 175 online enrolled generalist PSTs from the university were initially invited to participate, 30 consented to participate (23 generalist primary PSTs & 7 early childhood PSTs). Once consent was obtained, the PSTs completed the online survey. The investigating researchers were not privy to any consenting PSTs' actual names at any stage throughout the research process. As such, this avoided any power issues that may have resulted between a lecturer/unit coordinator and PST/student.

In the final week of semester (week 12), all 30 consenting pre-service teachers enrolled via online study mode were required to respond to a series of demographic and open ended questions via SurveyMonkey after experiencing the GoPro trial of the recorded on-campus practical PE classes. SurveyMonkey is a software program that enables researchers to collect data online. Questions included were purposely open-ended in design to encourage a more detailed response by the PSTs. An example question included, *'Do you think the GoPro technology has the potential to be beneficial for learning practical Physical Education activities? Why/Why not?*' The series of questions were distributed online by the research assistant.

Teacher Field Note Observations and Reflections

Descriptive qualitative accounts during the process of implementing the use of the GoPro technology were documented by the investigator via field note observations (Bogdan & Biklen, 1998; Morse, 1994). The field note observations were used to document protocol considerations of using GoPro as a teaching tool according to what was engaged in, seen, experienced, heard and thought of (Bogdan & Biklen, 1998; Morse, 1994).

Results

Perceived Potential of Using GoPro Technology to Capture Practical PE Classes

Bringing the On-Campus Practical Classes to Online Learning

The most positive aspects of use of the GoPro described by the PSTs included the camera's ability to capture key viewpoints of practical classes, whether that of the facilitator (Figures 4-5) or other PSTs (Figures 6-8). It was perceived as unique to view practical classes from a PST's point of view, picking up visuals and audio that students enrolled on campus get to experience. There appeared to be a reduction in learning anxiety of PSTs trying to learn HPE practical subject content from their computers or overlooking content delivered in class:

Early Childhood PST #7. *"For students like myself who are not able to attend lessons, it gives us an insight to what is being done at these sessions."*

Primary PST# 22. *"…as one who has not been able to attend the on-campus classes, it's interesting and informative to see the real lesson as it unfolds*."

Early Childhood PST #3. *"It is meeting the needs of those based in remote locations because it is usually difficult to undertake and engage in practical classes in rural areas away from the campus*."

The PSTs reported learning how to group students, different activities across a range of sport/game themes (e.g. net/wall, striking, invasion, target types) and they learnt different pedagogical approaches to activities (e.g. game sense, sport education models and cooperative learning):

Early Childhood PST #3. *"…the GoPro footage …captures key teaching cues from within class and how activities relate to the Australian curriculum for pre-service teachers*."

Primary PST# 14. *"I found it very useful in the practical... felt I was an active participator/part of the group learning important teaching activities and instructions*."

Similarly, PSTs perceived that the practical GoPro footage is crucial for those that happened to be absent from learning:

Primary PST #8 *"In particular for students missing prac classes*."

Figures 4 & 5: Simulated viewpoints of the facilitator instructing (Figure 4) and directing (Figure 5) activities

Revisiting and Reflecting on Practical Learning that has been Delivered

From the GoPro trial, many of the PSTs reported on the ability of the video footage to be streamed on multiple occasions to be beneficial for reflective purposes. The PSTs perceived that the video footage would also be important to critique their physical skills to effectively model to students in the future.

Primary school PST# 22. "*It allows students to re-visit and go over what is learnt on multiple occasions."*

Early Childhood PST #2. "*I believe … it allows students to go back and reflect on their physical activity*."

Early Childhood PST# 3.*"…provides (the GoPro) an affective reflection tool relating to class delivery to make sure practical teaching practices continues to improve and is optimised for the pre-service teacher*."

Primary School PST# 10. *"…can also benefit those who have the opportunity to re-watch their own movements in order to critique for future learning*."

A number of key teaching delivery components could be viewed multiple times in preparation to meet assessment criterions including lesson planning, classroom management, safety, positioning, scaffolding, transitioning and other teacher preparation aspects to improve classroom readiness. The footage was also referred to as a useful reflective tool for the facilitator of the practical classes:

Early Childhood PST# 2. *"…it (GoPro) provides an insight into the set up and delivery of a PE lesson*."

Primary PST# 4. *"… feedback for the student and instructor*."

Learning Style Benefits

The benefits of using the GoPro video footage to meet the PSTs' visual learning style was reported:

Primary PST# 14. *"…very useful for my learning. It provided a visual demonstration of what was being taught in the theory lessons, especially for Assignment 1 of lesson planning."*

Figures 6 & 7: Simulated examples of pre-service teachers engaging in basketball (Figure 6) and modified hockey activities (Figure 7)

Primary PST# 12. *"Visuals are fantastic as an external student. I felt a little closer to the learning environment."*

Primary PST# 6. *"Some students may also be visual or audible learners and the GoPro will help make it easier for people to learn."*

Primary PST# 22. *"Pictures (film) tell so much more and obviously a more lively lesson."*

The potential appeal to hands-on (kinesthetic) and audio learning styles was also referred to:

Primary PST #1. *"…works really well to experience the in-class perspective. For a hands-on learning subject this is especially important."*

Primary PST# 11. *"The real value is in hearing the activities explained and in gaining exposure to a variety of activity ideas*."

The Future of Online Practical Class Provision

Many of the PSTs described the use of portable technology such as GoPro as the beginning of a 'new era' in learning delivery. The PSTs believed that with the growing online learning market, a range of technologies would begin to be utilised to bridge the gap between on-campus and off-campus learning. Other PSTs noted the beginning of new methods to assess and monitor class skills:

Primary PST# 9. *"I think it has to potential to make higher education more readily available to students who are studying by distance, and that this will be the beginning of better teaching methods to these students."*

Primary PST# 16. *"…this is the beginning of bringing external students into the action. This will help students feel that they are participating and won't miss a thing*."

Early childhood PST# 3. "*It is a great idea and to develop an electronic skills portfolio*."

The Presence of Video Capture on Classroom Behaviour

The PSTs referred to the GoPro camera as having a presence during activities in that by recording interactions and activities students were wary of the device picking up behaviours that were untoward. Although the on-campus PSTs provided consent to capture the activities for online learning, there was an element of intrusivity that can be positive (trying harder to be on task) or negative (originally avoiding association with the wearer. Yet over time the PSTs became used to the innovation, especially once the learning benefits were made evident:

Early Childhood PST# 1. *"…it could be embarrassing for the student wearing the GoPro*."

Early Childhood PST# 4. "*…some great examples of exercises and watching students engage with the teacher throughout the semester*."

Engagement with the Digital World

Many of the PSTs reported that they already had access to the benefits of GoPro for recreational endeavours and were regular users of the Youtube platform in which the GoPro footage was streamed through. The benefits to students to engage with their digital world were regularly reported:

Primary PST# 23. *"I own my own GoPro and can first hand see how amazing the technology is. When strapped to an individual is guides as a first hand visual of an activity."*

Primary PST# 7. *"Youtube is better than more traditional recorded lectures."*

Perceived Areas of Improvement from the GoPro Footage

As the use of GoPro technology to capture practical PE class footage was a trial, there were some perceived areas for improvement noted by the PSTs that included the ability to capture all angles, sound and prevention of any shakiness during the footage of a PE practical class:

Primary PST# 13. "*…need to capture all relevant angles and get rid of any shaking during movement*."

Primary PST# 18.*"…there was occasional jerkiness and lack of sound."*

Primary PST# 11.*"…instructions could not always be heard*."

Some PSTs suggested the occasional shakiness could be difficult for some, yet felt that using the 'chest strap mount' was important for stable vision:

Primary PST# 6. '*…the experience may get overwhelming and dizzy with all the movements."*

Primary PST# 23. "*…attached to the chest…there is less back and forward movement*."

The PSTs also provided further clarity around the audio challenges. Other considerations perceived by the PSTs included an 'over emphasis' on technology and desires to be part of the action even more:

Primary PST# 8. *"…the audio- can be occasionally be hard to pick up. In particular, when giving instructions to a larger group beyond the immediate vicinity."*

Primary PST# 3.*"I believe there is too much emphasis on technology."*

Primary PST# 21. *"…I wanted to experience being on campus even more."*

Early Childhood PST# 1.*"…preferred the virtual experience to be totally perfected*."

Field Note Considerations Relating to the Implementation of GoPro Technology

The GoPro provided high definition video and was a robust, small device that didn't interfere with engagement in physical activities. Yet during the process of the GoPro trial there were a number of implementation considerations to optimise its use and delivery to engage pre-service teachers via the online platforms collected via investigator field notes (Table 1).

Topics	Implementation Considerations
Amount of video to capture	Facilitators will need to plan how much video to capture or which processes to devote the most time and energy towards within the lesson.
Audio constraints	Microphones could be required to capture audio for large sized outdoor classes.
Battery	Need to monitor battery life of the GoPro prior to delivery and level of battery charge.
Editing tools	Facilitator/instructor should ensure that editing tools are available to crop video clips to key segments, reduce length, provide activity titles and to mute inappropriate pre-service teacher conversations (e.g. personal conversations).
File storage	Video files are very large from the GoPro footage, so adequate storage needs to be considered via dropbox and online learning platforms. The uploading conversion rates to Youtube can be slow via the internet, yet once uploaded can be efficient for students to stream the footage.
Hair considerations of pre-service teacher volunteers	Chest strap mounts can prevent impacting hair.
Head tilting when viewing and instructing the class	Chest strap mounts prevent tilting and moving the camera when teaching compared to the head strap mount for the GoPro camera.
Heat/humidity during outdoor physical activities	Head and chest straps/mounts can get sweaty for students and instructor during delivery. Chest strap is the best consideration for hot climates.
Memory card	Memory card must be free to capture video footage prior to the lessons.

Video footage preparation	Trial and error with pre-recordings can ensure lighting, audio, head tilting and vision settings are appropriate in the proposed practical class setting context.
Video streaming	Consent will need to be obtained at the beginning of the semester to capture the footage and to stream via a private Youtube link. Voluntary wear should be encouraged.
Viewers of the practical classes	The number of viewers of the GoPro video footage can reduce over the semester as study demands get busier.
Workload	Ascertain whether extra personnel is required for downloading, editing and uploading footage via Youtube. The management and editing of the video footage is often beyond normalised workloads.

Table 1: A summary of implementation considerations of utilising GoPro technology to capture practical physical education classes for online delivery.

Discussion

This paper fills a gap in the international literature by reporting on PST perceptions of the potential and feasibility of using GoPro video technology as an innovation in online teacher education delivery of practical PE classes. The qualitative findings from the study revealed that the PSTs perceived that GoPro technology was highly valuable to re-visit, critique and reflect upon practical PE learning experiences, bridge the gap between on-campus and online learning PE delivery, further engage with learning styles/needs and described GoPro technology as part of the future of online provision of practical PE classes. The use of the GoPro technology was also perceived as being in touch with PST digital engagement and interests. Ensuring PSTs can engage with practical PE classes online is important to ensure learning experiences are provided to facilitate quality PE experiences to facilitate well qualified and confident educators (ICSSPE, 1999). Enhancing the PE beliefs and practices of PSTs during tertiary study from can play a major role in the future delivery of meaningful PE teaching which filters down into school students' learning of PE skills and outcomes (Morgan & Hansen, 2008; Tsangaridou, 2008). There is a strong connection between university teaching and learning experiences with the future effectiveness of in-service PE teachers (McMahon & Dinan-Thompson, 2014). Although there are many potential benefits of learning via online platforms such as the availability and tracking of learning, prompt feedback and time management (Bradford, Porciello, Balkon, & Backus, 2007), there has been little research into using video technology in teaching practice to bridge the gap between online and on-campus provision of practical PE classes. Bridging the gap between online and on-campus classes is important to enhance students' satisfaction with online learning (Pillay, Irving, & Tones, 2007). Whilst technology is often used to complement and improve teaching effectiveness during the delivery of PE lessons (Juniu, 2011), this investigation was innovative by bringing all the elements of face-to-face classes to those learning practical PE content online.

The application of technology with PSTs is not a novel concept. Over many years, PSTs have had their teaching delivery recorded with intentions of improving via self-reflective practices and external assessment (Baghurst, 2016; Casey & Jones, 2011; Mohnsen & Thompson, 1997). As we continue into this digital age of learning (Oblinger, 2004), video recording has become much more conveniently sized with realistic high definition vision able to change the way teachers can facilitate learning delivery to students (Knight, 2014). To date, there is only one study to the investigator's knowledge that has reported on the use of

GoPro technology within PE classes (Baghurst, 2016). Similar to findings from a United States GoPro study in PE (Baghurst, 2016), the findings from the present study revealed that facilitators can hear or see new aspects of PST lesson delivery during PE (beyond original in-class observations), effectively evaluate PE teachable moments and see the advantages of peer/self-evaluation of PST PE delivery. It is important to conduct research based around teaching PE to continue to improve the profession and in turn enhance the effectiveness of PE programs within school settings (Siedentop, 2009). Considerations in the present study for future use by Physical Education Teacher Education (PETE) facilitators of GoPro technology included use of chest strap mounts, rather than head strap mounts to prevent tilting and shakiness of the physical activity vision and microphones to optimise audio capture in open PE teaching spaces. In order for educators to re-enact, implement and research GoPro technology to simulate the learning within practical PE classes, implementation considerations are important. The teaching readiness of PSTs that are learning PE online is also a major and continuing consideration for teacher education providers and an area warranting further research (McMahon & Dinan Thompson, 2014.

Within the present GoPro trial, it was discovered simulating practical PE classes can ensure that PSTs accessing the class online could be further connected with key classroom delivery considerations for developing lesson plans. The GoPro technology was perceived by PSTs as reproducing strong interactions that occur within practical PE classes by imitating the appearances and characteristics of the more real life experiences (Murray, Grant, Howarth & Leigh, 2008). The PSTs were able to see activities unfold 'in practice' rather than simply listening to theoretical perspectives that related to classroom management, inclusiveness, safety, pedagogical strategies, scaffolding, transitioning and links to the curriculum. In addition to seeing key classroom delivery elements in practice, the PSTs were able to enjoy being able to access the footage to learn and reflect upon practical lesson delivery on multiple occasions. Self-captured video has been previously reported to support continued planning, teaching, and reflection (Hiebert, Morris, & Glass, 2003; Koellner et al., 2007; McDonald, Kazemi, & Kavanagh, 2013). The capturing of practical activities via mobile video from the GoPro ensured those that were absent from the PE class or may have over-looked certain content could revisit PE classes at a later time-point. The accessible use of a private youtube link for streaming also ensured the PSTs could easily stream the PE lesson content to their smart phones or tablets by being in sync with PSTs' 'digital worlds'. As online learning has taken off in recent years, the technology to enhance such learning will continue to develop and expand in order to address such an expanding market. With a duty to satisfy the learning demands of online students, the findings from the present GoPro trial show encouragement to further engage PSTs' learning styles in PE (visual and hands-on virtual experiences combined with useful audio instructions) through the online systems. Use of GoPro also has the potential to be a key marketing tool for higher education programs looking to be in touch with the 'latest in online learning provision'. With virtual and video technology constantly developing and expanding (Oblinger, 2004; Chalfen, 2014), future teaching and research could look to capture practical classes via 3D virtual reality headsets (Petry & Huber, 2015) and drone technology (aerial view) (Smith & Sefton, 2015) to benefit PSTs' learning experiences even further. Other research could look to compare the use of short 'intensive' PE sessions for online students visiting campus with the learning of practical PE classes via simulated GoPro footage throughout a semester.

As the current study was a 'trial' of the GoPro technology for practical PE provision, there were also a number of considerations identified from the PST responses and investigator field notes to improve future provision. With PE classes being 'action-packed' to ensure pre-service teachers are as active as possible, there can be some shaking or tilting during movement. Chest mounting (compared to head mounting) of the GoPro camera had a

greater potential to reduce such movement for learners. The chest strap has the added benefit of reducing the sweatiness of the strap and on any hair design/styles of those wearing the GoPro. Although the editing of videos can have implications for PST learning, both editors of the video (lecturer and research assistant) had a combined total of 20 years of teaching experience and ensured that key PE practical teaching interactions (e.g. teaching points, grouping, safety, classroom management aspects) were captured for the online learners. When uploading footage through the Youtube platform, there was an added benefit of adjusting the video to reduce any shakiness. In addition, as PE practical classes are regularly conducted in wide open spaces (e.g. gymnasiums, courts, ovals) the GoPro can have difficulty picking up sound on occasions, therefore microphones are a strong consideration to enhance audio during recordings. Such sound challenges during PE can be avoided by having the facilitator/teacher wearing the GoPro during recordings, rather than the PST (or both teacher and PST). To ensure PE learners can access both types of vision (teacher vision & student vision), the future consideration and research of multiple cameras during class could be a useful option. This could be important if there are any impediments to sound or vision on a single camera during PE classes. Nonetheless, it is evident that future research into the learning of PE practical skills and delivery using first person point of view video learning needs to continue.

A discussion of the implementation possibilities for simulation pedagogy via GoPro technology in PE, protocol considerations and future research directions for online PE are explored and presented within this paper. In a decade "when health and physical educationalists internationally are actively talking about and seeking quality PE" (Penney, Brooker, Hay & Gillespie, 2009, p. 438), the use of new teaching delivery methods in PE is important. The simulated footage of practical classes provides a tool to further enhance the learning experiences of externally enrolled PSTs by bringing them closer to the action and the interactions within PE practical classes.

Practical Implications for Teacher Education

Findings from the GoPro trial provide valuable understanding for teacher education providers of the potential for implementing GoPro technology to simulate practical PE experiences for PSTs and other learners via online platforms. It is important for teacher education providers to improve PST 'readiness' to teach quality PE. Bringing online learners 'closer to the action' within PE practical classes can ensure generalist PSTs are further equipped for effective planning, delivering, managing and reflecting on practical PE experiences. The present study is linked to the Australian Institute for Teaching and School Leadership (AITSL) standards that outline:

- 'Know the content and how to teach it' (e.g. PSTs can learn practical PE teaching strategies, how to organise content, how to apply various pedagogical strategies, link activities to the curriculum, understand assessment techniques to apply within practical PE classes, learn how to apply the GoPro technology simulation teaching experience; Professional Knowledge, Standard 2; AITSL, 2011);
- 'Plan for and implement effective teaching and learning' (e.g. strategies to plan, structure and sequence practical PE, methods to set learning goals, effective classroom communication practices such as positioning, teaching/safety/management cues, use of the whistle, use of voice; Professional Practice, Standard 3; AITSL, 2011);
- 'Create and maintain supportive and safe learning environments' (e.g. PSTs gain understanding of inclusive strategies in practical PE, management strategies for

behaviour, key safety considerations to apply during practical PE activities; Professional Practice, Standard 4; AITSL, 2011); and

- 'Assess, provide feedback and report on student learning' (e.g. PSTs can gain insight into effective methods to provide feedback during practical PE, develop understanding of assessment methods that can be applied during practical PE; Professional Practice, Standard 5; AITSL, 2011).

Conclusion

The qualitative findings from the study revealed that the PSTs perceived that GoPro technology was highly valuable to re-visit, critique and reflect upon practical learning experiences, bridge the gap between on-campus and online learning delivery, further engage with learning styles/needs and described GoPro technology as part of the future of online provision of practical classes. The use of the GoPro technology was also perceived as being in touch with PSTs' digital engagement and interests. Considerations for future use of GoPro technology included use of chest strap mounts, rather than head strap mounts to prevent tilting and shakiness of the physical activity vision and microphones to optimise audio capture in open teaching spaces. The findings from the GoPro trial provide valuable insight for teacher education providers for future planning of online university practical PE class delivery.

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