EDUCATIONAL RESEARCH IN ACTION

Video capture on student-owned mobile devices to facilitate psychomotor skills acquisition: *A feasibility study*

Glori Hinck, DC, MS, MET and Thomas F. Bergmann, DC

Objective: We evaluated the feasibility of using mobile device technology to allow students to record their own psychomotor skills so that these recordings can be used for self-reflection and formative evaluation.

Methods: Students were given the choice of using DVD recorders, zip drive video capture equipment, or their personal mobile phone, device, or digital camera to record specific psychomotor skills. During the last week of the term, they were asked to complete a 9-question survey regarding their recording experience, including details of mobile phone ownership, technology preferences, technical difficulties, and satisfaction with the recording experience and video critique process.

Results: Of those completing the survey, 83% currently owned a mobile phone with video capability. Of the mobile phone owners 62% reported having email capability on their phone and that they could transfer their video recording successfully to their computer, making it available for upload to the learning management system. Viewing the video recording of the psychomotor skill was valuable to 88% of respondents.

Conclusions: Our results suggest that mobile phones are a viable technology to use for the video capture and critique of psychomotor skills, as most students own this technology and their satisfaction with this method is high.

Key Indexing Terms: Chiropractic; Education; Psychomotor Performance; Video Recording

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INTRODUCTION

Many occupations require physical activity or finely tuned hand-eye coordination with training to help students develop proper technique.¹ Training is important especially for the development of the specific and specialized critical psychomotor skills inherent in many healthcare disciplines. Methods of teaching and learning, as well as issues of competence relevant to the creation of psychomotor skills for students in healthcare programs pose significant challenges. Platt² stated that “Millennials have arrived and they want tech-savvy, active-learning education.” Based on the 2011 Horizon Report,³ it now is time to explore the possibilities of mobile learning in healthcare education. In 2011, this report stated that the “time to adoption for mobiles is one year or less” and that these devices “merit close attention as an emerging technology for teaching and learning.”³

Students in healthcare professions have a large number of skills to master. Essential psychomotor skills for medicine have been identified and ranked, ranging from taking vital signs to surgical procedures.^{4,5} Chiropractic

students must learn complex psychomotor skills to become proficient practitioners. Developing the skill of delivering an effective high-velocity, low-amplitude (HVLA) manipulation, for example, requires learning how to identify a point of contact and leverage landmarks, maintain good practitioner posture and balance, transfer weight efficiently, obtain joint pretension with a light contact, and thrust with proper amplitude and speed.^{6,7}

One perhaps could argue that learning many healthcare-related psychomotor skills parallels the process of learning a skilled movement involved in an athletic activity. Movement analysis commonly is used to provide feedback to athletes to help improve sports performance.^{8–10} Bell and Bull¹¹ suggest the use of video in physical education for the evaluation of the skills performance of self and others, as well as for teacher feedback. Video feedback is a behavioral procedure used to improve skill execution in athletes that involves showing an athlete a video clip of their own performance.¹⁰ Video modeling involves presenting the athlete with a video clip of an expert performing the skill.¹⁰ Boyer et al.¹⁰ further suggest that combining video

modeling with video feedback enhances skill performance in gymnasts. A review of current literature in the health professions of nursing,¹²⁻¹⁵ medicine,^{16,17} osteopathy,¹⁸ and physical therapy¹⁹ revealed the use of video recording for assessing skills by faculty, but not for student review and reflection. A review of the literature found no studies related to the use of video modeling or video feedback in chiropractic education.

According to the 2012 Pew Digital Differences survey,²⁰ 88% of American adults own a cellphone, with 46% reporting Smartphone ownership. The Mobile Access 2010 survey²¹ found that 40% of 18- to 29-year-olds have watched a video on their phone and 60% use their phones to play games or record video. While mobile devices are ubiquitous, until recently, higher education has made little use of these convenient tools for learning. Mobile devices allow tools, such as video recorders, to be integrated into the classroom without the need for specialized equipment or support.³ Herrington²² argues there is justification for the pedagogic use of mobile technologies based on authentic learning. The use of mobile devices for learning allows the exploration of innovative teaching and learning practices, and facilitates anywhere, anytime, student-centered learning.²³

In our project, we evaluated the feasibility of using mobile phone technology to record chiropractic student psychomotor skills for use in reflective learning and video feedback.

METHODS

Our chiropractic technique department uses video modeling and video feedback as a supplement to help teach psychomotor skills. Students are provided with a video of the techniques they are required to learn as performed by an expert faculty member. They also are required to record select supervised spinal manipulations and to reflect on their technique in these videos by critiquing aspects of performance, including body position, contact points, thrust, and line of drive, with grading based on a rubric. The rubric is available at the journal web site as online supplemental material that accompanies this article. Students are not graded on their manipulation technique, but rather are graded on their reflection about their performance. In the past, the recordings used to support this reflective learning had been done first using VHS and then DVD technology. These methods require special equipment that limits the numbers of students who can participate at any one time, and also limits the location and angle of recording. In addition, VHS technology now is considered obsolete and significant technical issues were found with the use of DVD recording devices. As a result, we began to explore other recording options that would address the technical issues, and that also would support further student-centered teaching and learning, including the development of electronic portfolios. Could student-owned mobile devices perhaps be the recording tool of choice?

During the summer of 2010, 110 third-term students in the cervical and thoracic manipulative therapies (CTMT)

course were given the choice to record supervised chiropractic adjustments using DVD recorders, zip drive video capture equipment provided by the University, or personal mobile devices or digital cameras. During the last week of the term, students were asked to complete a 9-question survey created by the investigators, comprised of multiple choice and open-ended questions regarding the recording experience. The survey included details of mobile phone ownership, technology preferences, technical difficulties, and satisfaction with the recording experience and video critique process. This voluntary, anonymous survey was distributed in hard copy format to all students enrolled in CTMT and present in the CTMT labs on one specific day. Students were excluded if they were not enrolled in CTMT or were not present on the day the survey was administered. The instructors gave survey instructions and distributed the surveys, which also included informed consent, to each student at the beginning of the lab. Teaching assistants collected all surveys at the end of each lab. Students were not required to complete the surveys. Instructors were not involved in survey collection and were not aware of who completed a survey. Data were collated and results summarized using descriptive statistical analyses in Microsoft Excel (Microsoft Corp, Redmond, WA). The study design was approved by the Northwestern Health Sciences University institutional review board.

RESULTS

Of students enrolled in the CTMT course, 77 (70%) completed the survey (Table 1). Of those completing the survey, 83% indicated that they currently own a mobile phone with video capability. Additional follow-up questions were answered by those who had chosen to use the mobile phone option to record their adjustments. Of these, 90% thought that the video recording was of adequate quality to critique their technique. Students previously had been exposed to video capture using DVD recorders and were asked to compare their previous experience with DVD equipment to the current experience using mobile devices. Recording with a mobile device was preferred by 78%. Ability to transfer the recordings to the learning management system (LMS) appeared to be related directly to email capability of the mobile device. Students needed to transfer a video to their computer via email before they could then save these files for upload to the LMS. Only 62% of the students reported having email capability on their phone and this same percentage were able to transfer their video recording successfully to a computer.

A total of 72 students answered the question "Did you find viewing and critiquing a video of your adjustment to be a valuable learning experience?" and 88% agreed that it was, indeed, valuable.

DISCUSSION

Video has become a way to share experiences, express creativity, and convey ideas.¹¹ Cochrane and Batemen²³ suggest that the activity of capturing and uploading video

Table 1 - Responses to Survey Questions About Mobile Device Use

	<i>N</i>	Totals
Do you own a cell phone with video capability?		
Yes	64	77
No	11	
DK	2	
If no, are you considering purchasing such a phone in the next year?		
Yes	2	17
No	11	
Maybe	4	
What method did you use to record the video?		
My phone	51	77
Friend's phone	16	
Instructor's phone	2	
DVD	0	
Zip	1	
Camera	7	
Was the video recorded using your cell phone of adequate quality to allow you to critique your cervical adjusting skills?		
Yes	62	69
No	2	
Maybe	5	
In a previous course you recorded palpation skills using the DVD recorders. Which method did you prefer using?		
Cell	53	68
DVD	9	
DK	3	
Other	3	
Does your cell phone also have e-mail capability?		
Yes	43	69
No	24	
DK	2	
Did you experience any technical difficulties using your cell phone to record your video?		
Yes	62	69
No	7	
Are you able to transfer videos captured with your cell phone to your computer?		
Yes	43	69
No	19	
DK	7	
Did you find viewing and critiquing a video of your adjustment to be a valuable learning experience?		
Yes	63	72
No	3	
Maybe	6	

DK, do not know.

to student journals or e-portfolios for peer or instructor critique supports “social constructivist pedagogy,” thereby increasing student engagement and allowing students to construct new knowledge actively as they interact with their environments.

The recent increase in the popularity of Smartphones with video capability led us to experiment with using cell phones and other mobile devices to record chiropractic

adjustments. With this technology the student easily can record any number of manual procedures on their own device without the use of university video cameras or DVD recorders. They are not limited by the amount of laboratory equipment or by the placement of the recording device. They can view recorded procedures easily directly on a phone. This method allows for immediate review by the instructor and facilitates feedback leading to improvement of technique at the time of delivery. Students also can view their videos after transfer to a computer if a friend recorded for them, or if issues with device screen size or resolution are found. We have found that pointing out areas for improvement using a video recording can be more effective than simply using words to describe how the student can improve their technique.

Surveys are a simple and cost-efficient way to gather a large amount of information that can be used to inform departmental and University technology decisions. However, several limitations are present in this study design. Only 70% of the students participated in the survey. It is unknown how many of the nonparticipating students are mobile phone owners and if this lack of participation was related to not owning a phone. The survey instrument has not been used previously or validated. Statistical analysis is limited. Every attempt was made to keep the surveys anonymous and the instructors did not collect the surveys, but students may have been biased by completing a hard copy survey with their instructor in the same room.

There are limitations to the classroom use of a Smartphone or other mobile device. Most importantly, not all students own a device. However, this has not been a problem in our labs as students with mobile devices work collaboratively with those who are without. Digital privacy can be a potential issue any time that recording devices are used. All students in our labs are aware that recording is occurring and they have the opportunity to remove themselves from the viewing field if they choose. Videos are uploaded to Moodle, a password protected LMS, and once they are uploaded, students do not have access to the videos of their classmates. Once uploaded, videos are a part of the student Moodle record and are stored indefinitely. Students are informed that they are not to upload videos to the internet without permission of those included in the video. Digital media policies must evolve continually to keep pace with emerging technologies. While no additional software is required simply to view a video, additional software or costs, such as a data plan, may be involved for the student to process the recording so that it can be saved to their computer, or uploaded to an e-portfolio or LMS. Another potential issue is the sheer volume of different devices available that could impact the ability to troubleshoot any issues. As technology continues to evolve, we have found that mobile devices are more and more user friendly with few issues related to video recording or transfer.

While this study looked only at video recording of one type of psychomotor activity in one health care field, these types of recordings could be used as an evaluative and reflective learning tool for any psychomotor skill, from

acupuncture needle placement to physical examination procedures. Our focus has been on self-reflection and formative evaluation rather than grading the technique itself as demonstrated on video.

Results show that the majority of students enrolled in the CTMT course own a mobile device with video capability, and that they prefer this medium over other technologies available for video capture of supervised adjustments. This is important information for our department as we decide how to proceed related to technology integration. Using mobile devices in the classroom appears to support the “tech-savvy, active-learning style”² of our millennial students and may increase student satisfaction. Learning outcomes may improve as these recordings can be used to provide video feedback that can be combined with video modeling to facilitate skills development. Not only can the student review and reflect on their performance at their convenience, they also can receive immediate feedback from their instructor as they review the video together. New advancements in mobile device applications may provide even more support to the video feedback process by allowing review of a recorded video; adding slow motion, a drawing, or audio commentary; and then sharing this annotated video via email, text, or YouTube.

Future goals are to expand on how these performance videos are used for teaching and learning. We currently are exploring the feasibility of having students narrate their critique using the annotation feature of the Coach’s Eye (available in the public domain at www.coacheseye.com) application rather than submitting a separate written critique along with their video recording. After several terms of implementation and with ever evolving digital technology, most of the initial technical issues related to saving, sharing, and posting of videos have been resolved so that this expansion is feasible. It is important to note that not all students own a mobile device with video capability, but anecdotally these numbers are growing. We have not found lack of a phone or other mobile device to be problematic. This has been addressed by encouraging peer collaboration in the recording process. Supplemental data gathered on the survey included the type of mobile phones that the students owned and specific details of any technical issues they experienced. This information can be used by the information technology department to troubleshoot and improve the student experience.

CONCLUSION

Our results suggested that mobile devices are a viable technology to use for the video capture of psychomotor skills involved in health care education as most students own a mobile device and their satisfaction with this method is high. Based on these results, we will continue to use mobile devices for video capture in our technique department, and hope to expand their use into other areas of teaching and learning, including e-portfolios and peer technique review.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

About the Authors

Glori Hinck is an associate professor and Thomas Bergmann is a professor, both with the College of Chiropractic at Northwestern Health Sciences University. Address correspondence to Glori Hinck, 2501 West 84th Street, Bloomington, MN 55431; e-mail: ghinck@nwhealth.edu. This article was received September 28, 2012, revised January 18, 2013, and accepted January 25, 2013.

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