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The Effects of Instant Video Feedback on Perceived Competence.

The Effects of Self-Assessment Using Coach's Eye on Perceived Competence in
Elementary Physical Education

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fulfillment of the requirements for the degree of Master of Science in Physical Education

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The Effects of Self-Assessment Using Coach's Eye on Perceived Competence in
Elementary Physical Education

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Abstract

Engaging students in meaningful experiences that inspire them to be active both in and out of school is the primary goal of quality physical education programs (National Association of Sport and Physical Education & American Heart Association, 2012). One of the strongest influences on student engagement in physical education is their perceived physical competence (Bevens, Fitzpatrick, Sanchez, & Forrest, 2010; Carney, 2012). The purpose of this study was to explore how perceived physical competence was affected by the use of video feedback using the Coach's Eye application. Participants in this study were 60 fourth and fifth grade students. There were 31 participants in the technology intervention and 29 participants in the control group (no technology). Four class sections took part in this study (2 fourth grade, 2 fifth grade), each taking part in an eight-lesson unit on striking skills. Throughout the unit students worked in small groups video recording each other with iPads in order to evaluate their own progress. Participants used the iPad application Coach's Eye to review and assess their own videos. Before, during, and after the unit subjects took a modified sports and athletics subscale of the Children and Youth Physical Self-Perception Profile (CY-PSPP). The results indicated that there was no significant difference between the technology group and the control group. Slight increase in the levels of perceived competence among students in the technology group were identified, however there were no statistical difference in significance.

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The primary goal of quality physical education programs is to provide students with the necessary skills and knowledge to be active for a lifetime (NASPE & AHA, 2012). In order to create an effective physical education program, teachers need to create a positive environment where students are engaged and motivated to be active both in and out of school. One way to increase students' engagement and motivation toward physical education is to increase their perceived competence (Alderman, Beighle, & Pangrazi, 2006). Perceived competence can be defined as an individual's perception of his or her current competence in a specific context (Wigfield & Eccles, 2000). Students who have higher levels of perceived competence are more likely to be engaged in physical education as well as motivated to be active outside of school (Shen, 2012)

Researchers have found that there are several key strategies that teachers can employ that can influence students' perceived competence (Alderman, et al., 2006). One strategy for teachers is to build an environment in their class that fosters student's pursuit of self-improvement rather than obtaining a specific target (Lee, Carter, & Xhiang, 1995). Another strategy is to allow students to assess their own progress, providing them with a sense of comfort that can alleviate social pressures among peers and teachers (Ennis, 2010). Lastly, teachers who provide timely feedback toward their students see an increase in perceived competence levels. It is paramount that teachers explore different instructional styles, as well as new technology that can further engage students in physical education, and possibly have a positive impact on perceived competence.

Finding ways to get students invested and engaged in school is vital. Effective teachers must constantly incorporate new methods of instructional strategies and equipment/technology in order to engage students as the needs and interests of the

student population change (Spires, Lee, Turner, & Johnson, 2008). When exploring different ways to engage students in schools, the use of technology seems to be a clear choice for 21st century learners. Today, the use of personal mobile devices is ubiquitous in the U.S. There is evidence that students, like parents, are frequently using technology outside of school to play games and for social interaction (Spires, et al., 2008). For this reason it is critical that teachers and administrators find new ways to harness the power of technology to enhance learning for all students across different academic disciplines.

Tablet technology, such as the iPad, allows teachers and students to have easy access to video recording and immediate playback, which has the potential to aid the teaching of motor skills in physical education. The Coache's Eye Application allows users to playback in slow motion and to add graphics to focus on certain aspects of performance. In the field of physical education there is growing pressure for teachers to incorporate technology (Casey & Jones, 2011). Several studies have cited student's desires to see that their schools resemble the world that they live in, specifically the availability of technology (Spires et al., 2008). In Spiress et al. (2008) study, students reported that using technology made learning more fun. Incorporating technology into the physical education classroom offers numerous benefits, including classroom management, instruction and feedback, and assessments (Pyle & Esslinger, 2013). Using tablet technology such as iPads allows teachers to video record and playback information immediately, so that students have the opportunity to receive instant feedback. In this study, I examined how participants perceived competence is influenced by using the Coaches' Eye application on the iPad to monitor skill progress during an 8 day striking unit.

Significance

Researchers have found that students' perceived competence directly affects their motivation to engage in physical activity (Alderman et al., 2008). However, there is not enough research to support the link between student's perceived competence and their ability to assess/monitor their own progress using tablet technology. The tablet technology used in this study allowed students to view their performance using the playback feature on the iPad. This allowed students to engage in self and peer monitoring of performance throughout the unit of instruction. The results of this study have the potential to shape how teachers use technology in their classes.

Hypothesis

It is hypothesized that the results of this study will show that if students are given the opportunity to use an iPad, with the Coach's Eye application to monitor their skill development they will develop a higher level of perceived competence. Researchers have found that when given the opportunity to monitor their own progress students report having an increase in perceived competence (O'Loughlin et al., 2013). The ability to see video replay of practice sessions should also aide student's skill development as well as increase their perceived competence (Janelle, et al., 1997). Another contributing factor to this will be the lesson focus. Each lesson will have a clear lesson objective that focuses on skill improvement rather than competition. Researchers found that when students feel as though there is a mastery approach to the lesson, students report feeling more competent in their skills (Kalaja, Jaakkola, Watt, Liukkonen, & Ommundsen, 2009). Taking these elements into consideration, it is hypothesized that students will have an increase in perceived competence due to the influence of video feedback.

Limitations

The limitations in this study revolve around the limited access to students of different schools and demographics. All of the participants in this study were from the same elementary school in suburb of Boston, MA. This town is a moderately wealthy town with a median household income of \$125,000. Though there was be enough participants involved in this study to draw inferences about the population, there would be greater weight placed on the results if this study encompassed a wider population range.

Delimitations

A delimitation of this study was that data were only collected from one school. The school was located in a wealthy suburb with a mixture of multi-cultural students. Both the socioeconomic levels and culture of the school district are important factors that must be considered if attempting to generalize the findings beyond this setting. The intervention conducted in this study might have a different effect in another school district. The results of this study will provide valuable information to teachers and administrators about the relationship between using technology for self-assessment and perceived competence.

Another delimitation of this study was the selection of the Coach's Eye application as the method of video analysis. There are other applications that can be used to analyze and display videos for students, however this was chosen because of the familiarity the researcher had with the application and his experience seeing students use the application with ease.

The choice of having the students analyze their skill development during a striking unit was another important delimitation of this study. The unit was selected

because of the researchers knowledge of participants' experience with striking activities. In the three years before the study, participants have not experienced a prolonged striking unit in their physical education class. For this reason, it was assumed that the relative striking skill levels would be underdeveloped, allowing for similar growth across both grades.

Using the Child and Youth Physical Self-Perception Profile as the means for analyzing participants' perceived competence is another delimitation. The structured alternative format of the CY-PSPP can be challenging for young students, resulting in misleading data. Directions must be carefully explained and students must have some experience with the instrument in order to offset these challenges.

It is important to state that for this study, perceived competence will be defined as students' scores on one subscale, the sport skills subscale of the CY-PSPP test. The current research project is analyzing student's scores on the sport skills subscale and how it is affected by video analysis feedback. There are other forms of perceived physical competence that are not being taken into consideration in this study.

Lastly, as the primary physical education teacher for the participants involved in this study and the primary researcher, it must be stated that the potential for subjectivity bias existed throughout the study. All efforts were made to make sure that students received equal amounts of feedback and instruction when it came to the technology intervention and striking unit.

Definition of Terms

Perceived Competence. In this study, perceived competence was defined as participant's scores on the sport skills subscale of the CY-PSPP. (See Appendix I for sport skills subscale of CY-PSPP)

Self-Assessment. Self-assessment is the process of evaluating ones own personal status or progress as it relates to their actions, abilities, or attitudes.

Coach's Eye. Coach's Eye is an application that was used in both smart devices and tablets. It allowed the user to use a variety of graphics and replay speeds to more effectively analyze short videos.

Review of Literature

Most effective teachers are centrally concerned with student motivation. Engaging students in the learning process is a central component of a teacher's mission. It has been argued that perceived competence is one of the most influential factors that contribute toward student motivation in physical education (Bevans et al., 2010). Researchers have found that students who have high-perceived competence are more active during class (Bevans et al., 2010). Further research has shown that perceived physical competence has a direct effect on student's activity levels both in and out of school (Hagger, Ashford & Stambuoova, 1998). Activity time in class is important because early skill proficiency for children is a strong predictor of physical activity levels in adolescence (Barnett et al., 2009). If these skills are not developed at an early age, it can prove to be a barrier for later participation in these activities (Graham, Holt/Hale & Parker, 2010).

Self-Determination Theory

Deci and Ryan's (1985) Self-Determination Theory (SDT) represents a broad framework for the study of motivation and personality. SDT articulates a meta-theory for framing motivational studies, a formal theory that defines intrinsic and varied extrinsic sources of motivation, as well as the roles of motivation on cognitive and social development in individuals. According to SDT, individual's motives are shaped by their perceptions of competence, autonomy, and relatedness. Taking this a step further, individual's motivations are driven by an innate need for competence and self-determination in dealing with ones surroundings (Whitehead, 1993). Fulfilling our desires for competence and autonomy brings about a feeling of intrinsic reward that can sustain a person's motivation toward a specific activity. When people are internally motivated to

act, they have a greater sense of excitement, confidence, and general well-being (Deci & Ryan, 2000).

Perceived Competence

Perceived competence has been used to describe both global (Harter, 1982) and specific (Slingerland et al., 2014) perceptions of ability. Perceived competence describes one's beliefs about his or her ability (Ferrera-Caja & Weiss, 2000). Harter's (1982) work on the perceived competence scale for children looked at competence in a global manner. The skill domains of academic, social, and physical were assessed globally, not taking into consideration specific hierarchical subdomains. This is in contrast to studies of perceived competence in which one domain was assessed by gaining information on individual subdomain skills (Whitehead, 1995). For example, in the area of physical self-perception, researchers have developed subdomains such as, physical attractiveness, sport competence, strength, conditioning, physical self-worth, & global self-worth (Fox & Corbin, 1989). Individuals can have vastly different perceptions of each subdomain, contributing to their global sense of perceived competence.

The importance of perceived competence in physical education is clear, as it is critical to engaging students in physical education. Researchers have established a clear link between perceived physical competence and physical activities levels outside of school (Shen, McNaughtry & Martin, 2007; Taylor et al., 2010). Researchers argue that when students have higher levels of perceived physical competence, they will have a higher level of interest and enjoyment in physical education class as well as physical activities outside of school (Lyu & Gill, 2011). Motivating students in physical education class is an essential component of a teacher's practices. Raising student's levels of

perceived competence is one of the most effective ways of motivating students in class (Kalaja, Jaakola, Watt, Liukkonen, & Ommundsen, 2009). Understanding student's levels of perceived competence is paramount for teachers. For this reason it is essential that teachers use a valid and reliable instrument that can accurately measure student's perceptions at a global and specific level.

Children and Youth Physical Self-Perception Profile

Researchers have found that student's self-perceptions begin to become differentiated among domains as early as age 7 (Harter, 1985). Early versions of perceived competence scales took into consideration a limited number of subscales for competency. Harter's (1982) early work on perceived competence in adolescents focused on four domains, cognitive, social, physical, and general self-worth. In subsequent research (Fox & Corbin, 1989), specific competency domains were separated into subdomains to gather information on a deeper level. Fox and Corbin (1989) later developed the Physical Self-Perception Profile, a scale that focused on the physical domain. Through open-ended questionnaires, the researchers were able establish five contributing components of physical self-perception. These components were sport competence, body attractiveness, physical strength, conditioning, and physical self-worth. This approach allows for researchers to gain a clearer image of the individual elements that contribute to overall physical self-esteem (Fox & Corbin, 1989). At the time this assessment was used on college-aged students and has since been applied to adolescent aged students (Whitehead, 1995 & Slingerland et al., 2014).

The Children and Youth Physical Self-Perception Profile, first developed by Whitehead (1995) has been repeatedly tested to show that it is a valid measure of student's perceived physical competence (Slingerland et al., 2014, Hagger et al., 2005). Whitehead used several subscales directly from Harter's Perceived Competence Scale for Children, including the sports/athletics subscale (Harter, 1982). The CY-PSPP is an adaptation of the Physical Self-Perception Profile, which was first developed by Fox & Corbin (1989). This assessment allows students to distinguish between four different subdomains of physical perception: attractive body, strength, conditioning, and sports/athletics. Researchers have also used specific scales from this instrument to measure specific subdomains, giving credit to the multidimensionality of perceived competence (Slingerland et al., 2014).

Whitehead (1995) was able to successfully apply the physical self-perception profile to children in the seventh and eighth grade as a way of determining whether their self-perceptions had an effect on physical fitness scores. This project involved over five hundred students from three different middle schools, and was administered in two phases. Whitehead (1995) set out to test several hypotheses, first being that the factorial content of seventh and eighth graders physical self-perception would match that of college students since that was the research population of Fox & Corbin's (1989) study (Whitehead, 1995). The next hypothesis was that the global-to-specific hierarchy of student's self-perceptions would be present for this age group. Thirdly, in line with previous studies (Harter, 1985; Fox & Corbin, 1989), this study wanted to measure whether students were able to discount the importance placed on subdomain perceptions and whether or not this would have an effect on global self-perceptions. Next, as a

measure of concurrent validity, it was hypothesized that the subscales would correlate with physical fitness scores. Lastly, in order to measure construct validity the study aimed to test whether the instrument would discriminate between different groups that had been previously identified as high or low scorers by teachers.

Whitehead (1989) showed that most of the assumed hypotheses were affirmed. The primary aim of the study, to successfully replicate Fox and Corbin's (1989) work with seventh and eighth grade students, was met. The results showed that student's physical self-worth scores were accounted for by the results from the four CY-PSPP subdomains scales. These results also gave validation to the global to specific hierarchical theory of self-perception (Harter, 1982). This study affirmed the belief that examining physical self-worth can reveal important information regarding global self-worth. Going further, it was validated that the individual subdomains of sport competence, body attractiveness, physical strength, and physical condition mediated student's physical self-perceptions. The figure below illustrates the hierarchical relationship between the global self-worth and physical self-perceptions.

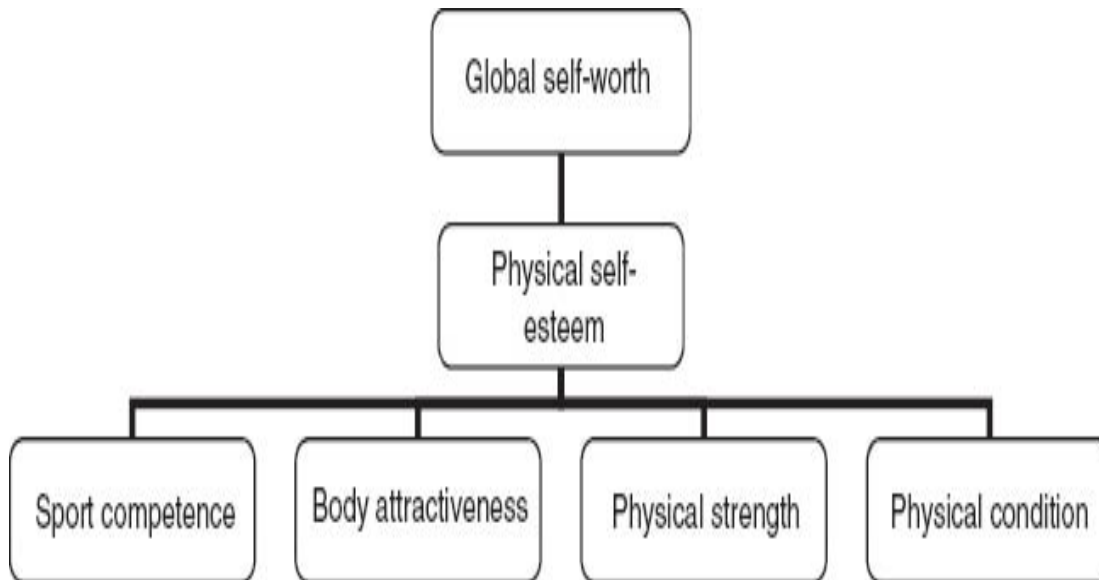


Figure 1 - Fox and Corbin's Hierarchical Organization of Self-Perceptions

Slingerland et al., (2014) successfully used the C-PSPP with students with 7th – grade students during a basketball unit. The studies' aim was to investigate how both perceived competence and moderate to vigorous activity levels were effected by single or gender-mixed game play situations. The study was comprised of 216 students within 13 classes (ages ranged from 11-15). The results showed that students, especially girls, had lower levels of perceived competence in mixed-gender game situations as opposed to single gender.

The CY-PSPP has been found to be both reliable and valid in several studies (Slingerland et al., 2014, Whitehead, 1995, Hagger et al., 2005). The Perceived Competence Scale for Children was first employed by Harter (1982). The emphasis of this scale was that students make distinctions between different subdomains of self-worth, and that each individual section was an important component of the child's overall perception of self. The Perceived competence Scale for Children was able to demonstrate

factorial validity, showing that there was moderate to high loadings on their designated factor (Harter, 1982). This factor pattern was shown to be reliable, being replicated in five additional samples (Harter, 1982). One important component of this assessment structure was the formatting of the questions. Harter used a "structure alternative format" to reduce social desirability responses. This format forces the participant to select one of two alternatives is most like themselves. From there, the participant must qualify their response, stating whether their response is really true or sort of true. Below is an example of a structure alternative format question:

Really True For me	Sort of True For me	Some kids would rather play outside	BUT	Other kids would rather watch	Really True For me	Sort of True For me
_____	_____				_____	_____

Figure 2 – Sample Question From Modified CY-PSPP

This format reduces the social desirability responses that are often accompanied by true and false questions.

Following the steps taken by Harter (1982), Fox and Corbin designed the Physical Self-Perception Profile in the same structured alternative format. This assessment was used on college age students, and the reliability, stability and validity was confirmed for all four subdomains, supporting multidimensionality within the physical domain (Fox & Corbin, 1989). Initial predictive validity of the subdomain subscales was showed through further evaluations of the subject's data.

Further developing the validity and reliability of Fox and Corbin's (1989) Physical Self-Perception Profile, Whitehead (1995) successfully used this assessment

(CY-PSPP) with 7th and 8th grade students. It was hypothesized that although the previously mentioned study targeted college age students, using the CY-PSPP for early adolescent aged students would not require different profile content (Whitehead, 1995). Results supported the reliability and construct/concurrent validity of the CY-PSPP scales. Since Whitehead's (1995) introduction of the CY-PSPP, there have been subsequent studies that have replicated the reliability and validity of the subscales used in this assessment (Hagger et al., 2005 & Slingerland et al., 2014). The utility of this assessment allows for researchers to gain valuable information regarding student's perception of the different components of their physical self. Using the information gathered, teachers can devise strategies to help improve the self-perceptions of students in the physical education class.

Understanding how to raise student's levels of perceived competence is critical to engaging them both in and out of school (Alderman et al., 2006). There are several factors that contribute to a class environment that fosters the development of perceived competence in students, including emphasizing personal growth rather than competition, giving students an opportunity to assess themselves, and timely feedback (Alderman et al., 2006). These factors all play a valuable and integral role in shaping students' conceptions of their abilities. The mission of quality physical education programs is to give students the skills and motivation to be active for a lifetime; therefore, increasing perceived competence should be a clear focus of teachers and administrators.

Personal Growth Rather Than Competition

The values and focus of a class have a significant influence on students' perceptions (Slingerland et al., 2014). When classes have an emphasis on learning and

improvement students have a higher sense of perceived competence (O'Loughlin et al., 2012). In physical education, when students are encouraged to practice and work primarily on skill development, they have higher levels of perceived competence (Kalaja et al., 2009). Placing an emphasis on performance outcomes and competition rather than the process of continual improvement hinders student's willingness to take risks and perform skills in the future (Alderman, et al., 2006). Further, students are more engaged when they are allowed to progress at their own rate, giving them a feeling that their success in class is self-determined rather than being judged by a predetermined measure of success (Bryan & Solmon, 2010).

There is additional evidence that indicates that creating an environment in class where competition is deemphasized can increase student's perceived competence. Slingerland et al., (2014) used the Children and Youth Physical Self Perception Profile (CY-PSPP) to measure student's perceived competence during game-play in single gender and mixed gender game play in middle school physical education. They found that by changing the context of the lesson to being less competitive, students had an increase in perceived physical competence. When students are placed in groups where they feel as though the focus of the game is more performance oriented and less self-improvement, many students become discouraged (Slingerland et al., 2014). As students got older, they tended to feel less competent when placed in a situation of social comparison (Lee, Carter & Xhiang, 1995).

Along with deemphasizing competition, discouraging peer comparison during class is an important component of a class culture that fosters the perception of personal growth (Vallerand, Gauvin, & Halliwell, 1985). Students identified that when they feel as

though performance outcomes are the focus of the class when competition and social comparison are emphasized (Ames, 1992). As students reach high school age, intense peer competition and comparison becomes one of the main reasons students choose not to participate in physical education (Van Daalen, 2005). In fact, in game-play situations students report having a higher level of perceived competence when all of the students involved are being cooperative, rather than competitive (Slingerland et al., 2014). When there is less emphasis on social comparison among students, individuals can focus more on their own progress.

Self-Assessment

Allowing students to take control of their learning environment has been shown to increase both motivation and academic achievement in students (Cauley & McMillan, 2010). Self-assessment supports learners to control their own learning, allowing them to analyze their own progress and develop specific targets to reach (O'Loughlin, et al., 2013). Being able to monitor their own progress and make necessary corrections can lead young students to become self-regulated learners (Zimmerman, 1990). Once children are able to engage in a task that they control, they begin to regulate their behavior, reacting to the progress that they are making (Eccles & Wigfield, 2002). This allows students to be able to adapt to feedback in a more effective manner (Zimmerman, 1989). Furthermore, when self-assessment is derived from formative feedback, it allows students to control the process in which they learn (Butler & Winne, 1995). The control that is gained by giving students the autonomy to progress at their own rate plays a key role in establishing student's internal motivation (Deci & Ryan, 1985).

Allowing students to take ownership of assessing their own growth can be a powerful incentive for academic participation (Hastie, Brock, Mowling & Eiler, 2012). The process of taking control of the learning environment increases student's intrinsic motivation to complete a task (Deci & Ryan, 1995). O'Loughlin, Chroinin, & O'Grady (2013) found that students were more engaged in class when they were able to assess their own progress. In this study, students gained immediate feedback from video analysis and as a result, they reported feeling higher levels of competence and motivation. As students begin to learn more about the progress they are making, they begin to feel more self-determined in the work they are doing. As their feelings of self-determination start to grow, their reasons for engaging in a task will be the result of internal motivation (Eccles & Wigfield, 2002). As mentioned above, learners who are able to monitor their own growth often become self-regulated learners. Self-regulated learners become more motivated to continue with a given activity when they are able to react in a positive manner towards their ongoing performance (Zimmerman, 2000). Along with being able to better improve their skills, students are able to gain a deeper understanding of the content area (Casey & Jones, 2011).

Giving students the opportunity to self-assess allows a wider spectrum of learners to engage in class. Students who do not regularly seek out feedback or help from teachers and peers may find that assessing one's own progress is less threatening (Andrade, 2010). Also, by allowing students to engage in self-assessment, teachers are empowering students who need different learning environment to be successful (Butler, 2002). Being able to monitor your own progress as well as make corrections gives students a more

individualized learning experience (Butler, 2002). Students can explore different options for practice after self-assessing their progress.

One issue that may affect the justification of using self-assessments is its validity. (Ross, 2006). Ross (2006) warns that students have difficulty in assessing their own skills because they may hold inflated views of their abilities along with not having the cognitive abilities to process feedback appropriately. Students also have the tendency to overestimate their abilities as it pertains to new skills (Dunning, Heath, & Suls, 2005). Though students have a difficult time accurately assessing their progress there are methods of self-assessment that can help students gain a truer image of themselves. Researchers have shown that video analysis aide's students assessing their own progress accurately (O'Loughlin et al., 2013). Research shows that when students are able to use video analysis to assess their skills, the views are more in line with those of their teacher (O'Loughlin et al., 2013).

Timely Feedback

Allowing students to gain immediate feedback from their work gives students the ability to self assess in a way that fosters the learning of physical skills (Chiviacowsky & Wulf, 2002). One way of giving students immediate feedback is replaying videos of their performance (Hazen et al., 1990). Using video replay as a tool for students to receive feedback as well as self-assess can allow them to gain a greater understanding and mastery of skills (Boyer, Miltenberger, Batsche, & Fogel, 2009). In their study of performance feedback, Janelle et al. (1997) showed that when students are given the chance to control the rate at which they can obtain feedback, they not only learn new skills faster but, are able to retain that information longer than other students (Janelle et

al., 1997). Further research has shown that students of all skill levels learn faster when they are able to control their feedback (Fairbrother, Laughlin, & Nguyen 2012). Using video replay allows students to receive feedback exactly when they want it. In their study, Chiviacowsky & Wulf, (2002) showed that students who gained feedback when they desired it acquired physical skills faster than students who were given it randomly.

In their research, Banville and Polifki (2009) found that because video-recording devices can be used to instantly give feedback, student's abilities to learn and perform motor skills increased. Hastie et al., (2012) found that students are better able to assess their own skills when able to use video recording devices. In this study students had the opportunity to assess their dribbling abilities with and without the use of video feedback. The results showed that the students were significantly more accurate at assessing their current progress when they were aided by video technology. Technology also has the potential to challenge students in new ways, allowing teachers to design learning experiences that achieve higher levels of engagement in students (Hall, 2009). Teachers can also use technology to give students access to greater amounts of information through interactive applications and web pages (Pyle & Esslinger, 2013).

Video replay's benefits are not only derived from its ability to provide immediate feedback but also by its very nature. Visual feedback has been shown to be more effective than none visual feedback when it comes to learning new skills (Abdollahipour et al., 2014). The nature of watching your-self perform a skill provides learners valuable information that is essential to learning a new skill. Students are able to watch several trials of the same skill performance and pinpoint specific errors that need to be corrected (Coker, 2004). Learners can receive information not only on performance but on

execution of the target skill as well (Boyer et al., 2009). Learners can watch the replay of their skill performance and compare how they did with previously identified cues (Coker, 2004). Providing students with the essential cues for a skill allows students to accurately analyze their performance when looking at video replay (O' Loughlin et al., 2013). This gives individuals a deeper understanding of the target skill (Hazen et al., 1990).

Although there seems to be numerous ways for teachers to engage students with technology, schools must make sure that teachers are trained well enough to use the equipment effectively. In one study that looked at middle school student perceptions of the use of technology in schools, Spires, et al. (2010), showed that students did not believe that technology was always engaging. In this study some students reported that using certain types of technology was "boring" and "irrelevant". Teachers must select the appropriate technology that matches the needs of the class and the students. Using technology alone does not ensure high quality education (Juniu, 2012).

Making sure that students are engaged in class is one of the most important roles of a physical education teacher. Creating a class environment that fosters perceived competence is an important way to motivate them to be active both in and out of school (Bryan & Solmon, 2012). For teachers, creating an environment in class that fosters personal growth as opposed to social comparison and performance outcomes helps ensure an increase in perceived competence from students. Allowing students to monitor and assess their own progress also engages students and gives them a better understanding of the skills they are learning (Casey & Jones, 2001). Giving students the opportunity to self-assess using an iPad with video recording and immediate playback gives them a more accurate depiction of their current abilities (Hastie et al., 2012). Through the use of

technology and self-assessments, teachers may be able to engage students on a deeper level, increasing their perceived competence.

In this study the researcher examined the link between student's self-assessment based on immediate video playback and perceived competence. Participants in this study filmed one another to gain a greater understanding on their current progress. This study is important because of the ramifications it could potentially have on further engaging students in physical education. Students who have a higher perception of their skills are more likely to be active in and out of school. The goal of a quality physical education program should be to give students the skills, knowledge, and motivation to be active for a lifetime. This study will provide valuable information to add to the growing field of research on student engagement and perceived competence.

Methods

The purpose of this study was to examine how the use of iPads to monitor progress toward skill development affects students' perceived competence. Students took part in an 8-class striking skills unit. During the unit there was a designated skill in each lesson that students practiced. For each skill, the teacher provided a list of essential skill cues for students to reference while self-assessing. Participants routinely worked in predetermined groups of two or three to video each other practicing skills using the iPad application Coach's Eye. Students used this application to analyze components of the skill they were doing well and aspects they needed to improve. The Coach's Eye application allowed users to interact with the video by using slow motion and graphics to highlight specific contents.

Participants

Participants in this study were 60 4th and 5th grade students. There were 31 students in the technology section and 29 students in the control group (no technology). Four class sections took part in this study (2 fourth grade, 2 fifth grade). The ages of the students range from 9-11 years old. The researcher was the physical education teacher for the unit of instruction examined in this study. Since participants in this study used iPads consistently throughout the study, it was important the population chosen was mature enough to properly handle delicate equipment. Participants had an opportunity to learn how to properly handle iPads in an active setting before the data collection phase of this study began. Institutional Review Board approval from Bridgewater State University was obtained and consent forms were returned by parents with the option of opting out (see Appendix II). One student opted out of the study.

Setting

The intervention phase of this study took place over an eight-class (4 week) period. The two groups in this study (the technology group and the control group) were each comprised of one 4th grade class and one 5th grade class (4 classes total). All four classes were taught the same lessons, however the two classes in the technology group used the iPads to film each other practicing in small groups. After video recording one another practicing, students then reviewed their video through the application in order to analyze their skill progress.

The focus of the unit was to teach students a variety of striking skills, including striking with paddles, rackets, and long handed implements. The focus of the unit was to develop student's fundamental striking skills in a variety of areas. In this unit (see Appendix III), participants began by practicing simple striking skills such as hitting a ball along the ground as well as striking a stationary ball (i.e. floor hockey and batting a ball off a tee). As the unit progressed participants then began to practice more dynamic skills such as rallying with a partner and striking a moving ball. All of these activities incorporated a variety of equipment for participants to use, matching their current level of skill development.

Materials

In this unit participants had access to iPads. Each group used one iPad and the application Coach's Eye in order to analyze videos recorded of fellow students.

Measurement

To measure perceived competence, participants in this study were given a modified version of the sports/athletics subscale of the Children and Youth Physical Self Perception Profile (CY-PSPP). The CY-PSPP was first used for students in this age group

by Whitehead (1995). The sports/athletics subscale used, which is a component of the CY-PSPP, was developed Harter (1982). This instrument is an adapted version of the Perceived Competence Scale for Children (Harter, 1982). During its initial use, the Perceived Competence Scale for Children showed both its validity and reliability across 5 different samples (Harter, 1982). Since the development of the CY-PSPP, there have been multiple studies that have confirmed the construct/concurrent validity of the subscales used in this instrument (Hagger et al., 2005 & Slingerland et al., 2014).

Although there are several subdomains that are considered in this assessment, students focused on the Sport Competency aspect of this assessment. This decision has been made due to the nature of the unit focus (striking skills). The questions in this test were modified in order to give specific focus to the physical skill of striking. Since this measurement is in the public domain, permission was not needed. These questions have been altered in the past (Slingerland et al., 2014) to reflect students' feelings regarding a specific skill.

Procedure

Before the data collection phase of this study, all participants were instructed how to properly use the Coach's Eye application for iPads. The week before the study began, participants had 2 class sessions to learn about the equipment and familiarize themselves with the inner workings of the Coach's Eye application. Allowing the students to get comfortable with the technology was important in order to minimize the amount of time during the striking unit dedicated to technology instruction. Throughout the unit each class had two 30-minute classes per week. The class was structured to provide high

activity time so that participants had as much time to practice and receive feedback as possible.

Each participant in the technology group had 4 opportunities to engage in video feedback. Participants did not use the technology during each class, giving them time to focus on developing their skills. When participants did use the technology they were working in groups of two or three, in order for one participant to video one or both while they practiced individually or rallied with one another. After being videoed, participants had the opportunity to self-assess their own performance. Since each lesson had a designated skill that was being focused on, when participants reviewed their video recording they used previously highlighted skill cues to assess their own development.

Data Collection

All participants were given the CY-PSPP questionnaire prior to the unit of instruction, at the midpoint of the unit, and post of the striking unit of instruction. There were two classes that served as the control group (one 4th grade class and one 5th grade class). The data collected from the control groups was compared to that of the intervention group in order to measure whether or not any changes in perceived competence could be attributed to the technology intervention.

Data Analysis

A mixed factorial analysis of variance was used as the method of data analysis for this study. Items in this questionnaire were modified to focus on student's perceptions of their physical skills as they pertain to striking skills. Participants evaluated 6 statements regarding their feelings about their striking abilities. Using a 4-point scale, participants

indicated how relevant those statements are to the perception of their abilities. This instrument belongs to the public domain, allowing me to use it freely.

Results

A mixed factorial analysis of variance was conducted to assess the effect of the Coach's Eye intervention on participants' scores on the CY-PSPP across three time periods (pre-test, mid-test, post-test) for 4th and 5th grade students. A total of sixty participants were placed into two groups ($n=31$ technology intervention, $n=29$ control). All participants took part in a month long striking skills unit where they video recorded each other four times over eight classes. Participants practiced their striking skills in hockey, baseball, and speedminton. Participants used the video recordings as a way of self-assessing their own skill development.

Table 1 displays the raw data for results of the assessments participants took. The values in the mean section (see Table 1) refer to the average scores for each group (Intervention group and control group) on the CY-PSPP. The CY-PSPP has a possible score range of 6-24, with 24 representing the highest score. In the standard deviation column (see Table 1), scores indicate the placement of each group's score on a normal statistical distribution. There was no significant interaction between intervention and time, Wilks' $\Lambda = .97$, $F(2, 57) = .43$, $p > .05$, partial eta squared = .03. There was no significant main effect for time, Wilks' $\Lambda = .98$, $F(2, 57) = .61$, $p > .05$, partial eta squared = .02, with neither group showing a meaningful change in CY-PSPP scores across the three assessments (see Table 1). The main effect comparing the technology and control groups was not significant, $F(1, 58) = .71$, $p > .05$, partial eta squared = .01, suggesting no difference between the group using technology in their lessons and the control group.

(Table 1.)

Table 1				
<i>Participants Scores on the CY-PSPP Over Three time Periods.</i>				
	Group	Mean	Std. Deviation	N
Pre-test	Technology	17.00	3.54	31
	Control (No technology)	16.55	3.79	29
	Total	16.78	3.64	60
Mid-test	Technology	17.16	3.36	31
	Control (No technology)	16.58	3.65	29
	Total	16.88	3.48	60
Post-test	Technology	17.70	4.34	31
	Control (No technology)	16.48	3.71	29
	Total	17.11	4.06	60

Discussion

The purpose of this study was to examine if the use of iPads to monitor progress toward skill development using the application Coach's Eye had a significant effect on fourth and fifth grade student's perceived competence. The results of this study indicate there was no difference in between the intervention and control groups. Although the participants in the technology intervention saw an increase in their CY-PSPP scores compared to their classmates in the control group, the margin of growth was not large enough to indicate statistical significance.

There are a number of reasons that can support an explanation for the results of this project. First, the limited experience participants had with using technology, specifically the Coach's Eye application, to self-assess their own skill development had the biggest influence. Second, choosing to have the participants practice a wide variety of striking skills did not allow students sufficient time to practice and improve in any one particular area. Lastly, not providing participants enough autonomy to self-assess their development with the iPads may have negatively affected motivation.

An obstacle that participants faced was their use of the video analysis application Coach's Eye. Before the data collection phase of this study, participants were exposed to the iPad and had time to practice video recording one another during game play. Though, this initial trial seemed to be successful, the researcher found that more time was needed for this population to become fluent enough in the effective use of Coach's Eye. There were a number of instances where the researcher stepped in to help participants with the technology, taking away time from both feedback time and practice

In the right setting, Coach's Eye may be a useful tool for teachers and coaches. It allows the user to fast forward, rewind, and focus on particular parts of a video, features that have been shown to enhance skill development (Boyer, Miltenberger, Batsche, & Fogel, 2009); however, these features did not support the development of perceived competence among 4th and 5th graders in this study. Prior research has shown that because students can gain feedback immediately from video recordings, this may allow students to increase their skills and knowledge (Banville & Polifki, 2009). For this reason practitioners should still consider video feedback as a potential tool for increasing student's skills and perceived competence. However, if technology is going to be used for self-assessment it is imperative that students are fluent with the technology. Students need to know how to use it in order to track their skill progress. Students need to know what skill cues to look for and how to find them. If students are not fluent with the technology, they will not be able to properly assess their own abilities.

Additional changes to the study design would be to allow participants more practice time for a specific skill. With additional practice and training, perceived competence regarding their striking skills may have increased. Previous research has shown that having too many skill cues and information given to students can overwhelm them and inhibit their learning (Belka, 2002). The focus of the unit of instruction for this study was on striking skills (e.g., striking a ball with a hockey stick, striking a ball off a tee, and striking a ball using a speedminton racket). Despite the focus on skill development, one of the primary explanations for a lack of difference was that participants did not spend enough time at any one skill for long enough to practice and acquire these new skills (Hastie et al., 2012). The length of the each technology

intervention for each skill may not have allowed participants to use the technology to enhance learning (Wood, 2005). With more of a focus on one striking skill, participants would have had more time to practice and further use the technology to track the development of that striking skill.

In this study, participants were assigned to small groups, given specific cues to practice, and then were instructed when to video and when to look at their videos for feedback. This management style was implemented so that transitions between activities could be done efficiently. However, this emphasis on efficiency potentially infringed upon student's feelings of freedom and autonomy. One of the advantages of having students assess themselves with video is that it allows students to become self-regulated learners (Janelle et al., 1997). Allowing students to gain feedback whenever they want helps to increase their motivation in class (Deci & Ryan, 1985). With more control over the learning environment, students adapt to feedback more effectively (Zimmerman, 1989). Gaining control over the learning environment also helps maintain motivation for a given activity (Zimmerman, 2000).). Not allowing participants to freely gain feedback at anytime may have hindered their feelings of autonomy, resulting in a decreased sense of motivation. The lack of autonomy may also have made them feel restricted in regard to what. Future research projects may want to structure their feedback systems with an aim of increasing student's freedom and autonomy.

When considering the impact of the limitations from this study, it is important to understand them in context. The previously discussed factors all played a part in the results of this project. Each factor may have had a different effect on the participants. When considering future research related to the effect of video feedback on perceived

physical competence, researchers should factor these limitation into the structure of their experiment.

Conclusion

There is ample need for further research regarding the link between video feedback and perceived competence in physical education. Tablet technology is a tool that can potentially engage and enrich students' experiences. Video feedback serves as an ideal method in aiding student's self-perceptions (Janelle et al., 1997). Instant visual feedback allows students to gain a greater understanding of the physical skills they are learning (Boyer et al., 2009). The current study did not show a positive link between the use of video feedback and perceived competence levels among 4th and 5th grade students. Participants were not experienced enough with the technology to effectively use it for self-assessment. However there are valuable lessons that can be gained from this study. We know that students will not be able to properly assess their own abilities with the help of tablet technology if they are not fluent with that technology. There is a future for video feedback in physical education; however, if it is going to be used to allow students to assess their own progress, they need to be well experienced using it.

Engaging students in physical education and aiming to raise their physical self-perceptions should be a focus of all PE teachers. Gaining further insight in this area must be a priority for both teachers and researchers.

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Appendix I

Bergin's Adapted Version of the
Children and Youth Physical Self-Perception Profile (CY-PSPP)

What I am Like

Age: _____

Grade/Class: _____

Boy or Girl (Circle One)

Sample Sentence

Really True For me	Sort of True For me	Sample Sentence	Really True For me	Sort of True For me
_____	_____	Some kids would rather play outside BUT Other kids would rather watch	_____	_____
1. _____	_____	Some kids do very well at striking skills BUT Other kids don't feel they are very good when it comes to striking skills	_____	_____
2. _____	_____	Some kids wish they could be a lot better at striking skills BUT Other kids feel that they are good enough at striking skills	_____	_____
3. _____	_____	Some kids think they could do well at just about at any new striking skills activity they haven't tried before BUT Other kids are afraid they might not do well at striking skills they haven't tried before	_____	_____
4. _____	_____	In games and striking activities some kids watch instead of play BUT Other kids usually play rather than watch	_____	_____
5. _____	_____	Some kids feel they are better than others their age at striking skills BUT Other kids don't feel they can play as well	_____	_____
6. _____	_____	Some kids don't do well at new outdoor BUT Other kids are good at new striking games	_____	_____

striking games **BUT** right away

Appendix II

Striking Unit Outline With Specific Lesson Focus

Striking Skills		
Lesson Number	Lesson Content	Lesson Focus
1	Hockey	Stick handling and passing
2	Hockey	Stick handling and Passing
3	Hockey	Small sided game play
4	Baseball	Striking off a tee (Tee Ball Target)
5	Baseball	Striking off a tee (Tee Ball Target)
6	Speedminton	Rallying with a partner
7	Speedminton	Rallying with a partner
8	Speedminton	Game play with low compression balls

Appendix III
Statement to Subjects and Instructions

Statement to Subjects

My name is []. I am a researcher from [] and I am here to ask for your help. If you would be prepared to help us find out some very important information about how kids of your age feel, we would be very grateful.

You do **not** have to help us if you don't want to. If you don't want to help it won't be held against you in any way. If you don't wish to fill out the questionnaires (that are about to be given out), you can just sit quietly while the others complete them--or you can hand in a blank questionnaire at the end. Nobody will ever know that you didn't do it.

You will notice that you **don't** put your name on the questionnaire. This is to make sure the answers are kept private and confidential. When you hand in the questionnaire to me I will quietly ask you your name so that I can match it up with the ID# on a separate sheet. Only **I** will ever get to look at this sheet. Neither your teachers or anybody else would be able to identify your answers even if they were allowed to see the finished questionnaires--which they won't! Nobody else will ever know if you volunteered to help or not. I will keep all the information **completely confidential** so that none of you need worry about being embarrassed in any way.

Because the information will be kept completely confidential you should not hesitate to be absolutely honest in your answers. In fact, because it is perfectly natural for people to be different from one another, there are no right or wrong answers to any of the questions. If you really feel that you cannot answer according to how you truly feel, then leave the questionnaire blank. Nobody will know.

Thanks for listening to my introduction. Now this is how to fill out the questionnaire. . .

Instructions to the Children

As you can see from the sentences, and the top of the sheet where it says "What I Am Like," we are interested in what each of you is like, what kind of a person you are like. This is **not** a test. There are **no right or wrong answers**. Since kids are very different from one another, each of you will be putting down something different.

First let me explain how the questions work. There is a sample question at the top marked (a). I'll read it aloud and you follow along with me. . . This question talks about two kinds of kids, and we want to know which kids are most like *you*.

1. So, what I want you to decide first is whether *you* are more like the kids on the left side who would rather play outdoors, or whether you are more like the kids on the right side who would rather watch T.V. Don't mark anything yet, but first decide which kind of kid is *most like you*, and go to that side of the sentence.
2. Now, the *second* thing I want you to think about, now that you have decided which kind of kids are most like you, is to decide whether that is only *sort of true for you*, or *really true for you*. If it's only sort of true, then put an X in the box under sort of true; if it's really true, then put an X in that box, under really true.
3. For each sentence you only check **one** box. Sometimes it will be on one side of the page, another time it will be on the other side of the page, but you can only

check *one box* for each sentence. You don't check both sides, just the *one* side most like you.

4. OK, that one was just for practice. Now you can do the other sentences yourselves. For each one, just check one box, the one that goes with what is true for you, what you are most like.

Appendix IV

Results

	Group	Mean	Std. Deviation	<i>N</i>
Pre-test	Technology	17.00	3.54	31
	Control (No technology)	16.55	3.79	29
	Total	16.78	3.64	60
Mid-test	Technology	17.16	3.36	31
	Control (No technology)	16.58	3.65	29
	Total	16.88	3.48	60
Post-test	Technology	17.70	4.34	31
	Control (No technology)	16.48	3.71	29
	Total	17.11	4.06	60