Spring 5-2-2020

Exploring HPE Teachers' Self-Efficacy Toward Technology Integration

Danielle Werner
Bridgewater College, dwerner@eagles.bridgewater.edu

Exploring HPE Teachers' Self-Efficacy Toward Technology Integration

Danielle M. Werner

Health and Physical Education, Bridgewater College

Author Note

Danielle Werner, Flory Honors Program, Bridgewater College

3186 Lanier Lane, Massanutten, VA 22840, 540-830-0152, dwerner@eagles.bridgewater.edu

This research is part of the Flory Honors Program curriculum at Bridgewater College

Abstract

The digital age has specifically called on physical educators to enhance their instruction using various digital tools (Krause, 2017). Although it is evident that physical educators need to incorporate technology, few studies have examined in-service physical education teachers perceived self-efficacy to integrate technology in their curriculum, and how mastery, vicarious, and social persuasion experiences impact overall self-efficacy. The purpose of this research is to analyze health and physical education (HPE) teachers' self-efficacy toward technology integration in the physical education classroom, with a specific focus on how teachers' present self-efficacy to integrate technology in physical education is related to prior training and experiences with technology. This quantitative study included 57 current HPE teachers who participated in a Computer Technology Integration Survey for Physical Education (CTISPE). Findings revealed that mastery experiences and social persuasion during physical education teacher education (PETE) programs may impact teachers' present self-efficacy toward technology integration in physical education. Type of technology preparation during PETE programs and years of teaching did not predict teachers' present self-efficacy toward technology integration in physical education.

Keywords: self-efficacy, technology, teacher education, physical education

Exploring HPE Teachers' Self-Efficacy Toward Technology Integration

Digital skills are becoming essential to completing daily activities and being an engaged citizen in today's societies (Grand-Clement et al., 2017; Koekoek & Hilvoorde, 2018). As a result, many schools are using technology to prepare students for the digital world. As new technology has become cheaper and more accessible, integrating technology into instruction has become possible, and even standard. The digital age has specifically called on physical educators to enhance their instruction using various digital tools (Krause, 2017). This gives physical educators the challenge of incorporating movement and technology simultaneously (Koekoek & Hilvoorde, 2018). The goal of physical education is for students to develop skill competence, ultimately increasing their confidence and desire to be physically active (Roetert et al., 2017; Society of Health and Physical Educators [SHAPE], 2020). Although technology may seem contradictory to this goal, teachers should be aware of the benefits technology has to offer their curriculum, and strive to increase their self-efficacy to integrate technology in the physical education setting in order to give students the best experience possible in physical education (Krause, 2017; Lambert, 2016).

Technology in Physical Education

Digital devices commonly used in physical education include interactive whiteboards , tablet computers, laptops, video-analysis, wearable activity tracking devices, positioning devices, and video games (Mohnsen, 2008; Sargent & Casey, 2018; Scrabis-Fletcher et al., 2016). These types of devices are used to assist students in reaching their physical activity goals and to help teachers enhance instruction. IPads can be used for a number of purposes in physical education including peer assessment, self-assessment, demonstrations, and prompting (Sinelnikov, 2012). There are many apps available for tablet computers that use video analysis tools such as

CoachNow, Coach's Eye, Hudl Technique, and iAnalyze, to help students improve skill performance through peer and self-assessment (Laughlin et al., 2019). Casey and Jones (2011) found that students showed an improvement in the ability to recite cues for skills when using video technology to observe their mistakes and work toward improving them.

Another device that is commonly used in physical education is a wearable tracking device. Wearable activity tracking devices can range from pedometers to smart watches. Pedometers allow students to automatically receive feedback on their step count and are inexpensive enough to be used for activity during the entire day, not just in physical education class. Another benefit of using pedometers is that it allows students to create their own goals based on their current level of performance (Morgan et al., 2003).

Despite the many benefits of integrating technology in physical education, not all use of technology in physical education is appropriate or positively perceived by students (Marttinen et al., 2019). One study on the use of heart rate monitors in physical education showed that teachers should exercise caution when using technology to determine overall success and grades (Partridge et al., 2011). Specifically, Marttinen et al. (2019) found that students had negative perceptions of using wearable technology devices in physical education, because they could not wear them during some sports practices, they were too bulky, they did not have the software to track their progress on their home devices, and they lead to more homework assignments. These negative student perceptions could be a result of teachers' lack of purpose for using technology in physical education, which could have created a misunderstanding among students. Having a lack of purpose for using technology in physical education is common, and thus, physical education would benefit from a "digital pedagogy" that gives educators ways to incorporate

technology appropriately (Koekoek & Hilvoorde, 2018). However, incorporating technology in a meaningful way in physical education is still difficult, especially without proper training.

Technology Competencies

In order to seamlessly mesh current physical education goals with various technological tools, teachers must be proficient in using technology (Krause, 2017). Krause (2017) found that many physical educators are not receiving adequate training to effectively integrate technology. PETE program studies have also recognized students' lack of preparedness to integrate technology (Juniu et al., 2013). In order to better prepare physical educators, the Society of Health and Physical Educators (SHAPE), a national organization, has identified the need for technology standards for PETE programs. The National Standards for Initial Physical Education Teacher Education (NSIPETE; SHAPE, 2017) include three standards specific to technology that require teacher candidates to

- 3.e: Plan and implement learning experiences that require students to use technology appropriately in meeting one or more short- and long-term plan objective(s).
- 4.e: Analyze motor skills and performance concepts through multiple means (e.g., visual observations, technology) in order to provide specific, congruent feedback to enhance student learning.
- 6.c: Describe strategies, including the use of technology, for the promotion and advocacy of physical education and expanded physical activity opportunities.

These standards serve as guidelines for PETE programs to use in preparing their students for integrating technology into their teaching. It is important for PETE programs to focus on this because the benefits of the integration of technology are twofold; students can become more engaged and teachers can improve their instruction (Kuklick & Harvey, 2018). Thus, physical

educators need to improve their confidence and competence in using technological tools in order to improve instruction and foster student engagement.

Although it is clear that physical educators need technology training, how to best structure technology education within PETE programs to adequately prepare students is unclear. One way is to provide a domain-specific technology course in the physical education setting (Wyant et al., 2015). A second way is to integrate technology across an entire PETE curriculum rather than offering a single technology course. This could include faculty modeling various technologies for PETE students to increase their technological pedagogical content knowledge (TPACK) (Scrabis-Fletcher et al., 2016). TPACK is a teacher's knowledge and ability to use technology in a purposeful, appropriate way that enhances instruction of a particular content (e.g. physical education). Research examining training and preparation for teachers to appropriately integrate technology in the physical education setting and how this preparation impacts their beliefs in their ability to do so is limited. Gibbone et al. (2010) suggests, "If we better understand attitudes of physical education teachers and what influences technology use, this can provide useful information for practitioners, administrators, and PETE programs" (p. 29).

Self-Efficacy Toward Technology Integration

Self-efficacy theory provides a framework through which to explore teachers' use of technology in their physical education instruction (Krause, 2017). Bandura (1997) defines perceived self-efficacy as, "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). In other words, self-efficacy is an individual's belief in their ability to engage in a specific behavior. According to self-efficacy theory, when individuals have a higher self-efficacy toward a particular behavior, they are more likely to engage in that behavior. Therefore, physical education teachers who have a higher self-

efficacy toward technology integration are more likely to use technology to enhance their physical education instruction.

Bandura further explains that there are three sources of self-efficacy: mastery experiences, vicarious experiences, and social persuasion. These sources of self-efficacy provide avenues for individuals to develop their self-efficacy. For example, a mastery experience in physical education includes a teacher successfully incorporating new technology into their instruction. A vicarious experience includes a teacher observing a colleague incorporating technology. Lastly, social persuasion includes feedback from others about using technology in physical education. An individual can increase their self-efficacy through any combination of mastery, vicarious, or social persuasion experiences.

Although physical education teachers can increase their self-efficacy using several sources, research to show which source produces the most significant increase in self-efficacy to integrate technology in the physical education setting is lacking. Previous studies have found that mastery, vicarious, and social persuasion technology experiences in the physical education setting, allow individuals to develop technology competencies and self-efficacy (Krause, 2017; Baek et al., 2018). These studies focused on the development of student teachers and current teachers enrolled in a graduate program. However, few studies have examined in-service physical education teachers perceived self-efficacy to integrate technology in their curriculum, and how mastery, vicarious, and social persuasion experiences impact overall self-efficacy.

Exploring current physical education teachers' self-efficacy toward technology integration can assist school districts with adapting professional development opportunities to meet the needs of their physical education teachers. This research can also provide PETE

programs feedback on how to structure their curricula to effectively prepare their students for using technology in the physical education setting.

Therefore, the purpose of this research is to analyze HPE teachers' self-efficacy toward technology integration in the physical education classroom. The research question that steered this study is: How is teachers' self-efficacy to integrate technology in physical education related to prior training and experiences with technology?

Methods

Participants

A total of 141 Virginia teachers across 5 school divisions in the Shenandoah Valley were invited by email to participate in an online survey for this study. The survey produced a response rate of 40.4% (N = 57). The participants reported teaching at either the elementary (*n* = 25) or secondary (*n* = 32) level. Participants' level of education varied with 59.6% holding a bachelor's degree (*n* = 34), 36.8% with a master's degree (*n* = 21) and 0.03% indicating other (*n* = 2). All teachers except one (*n* = 56) reported participating in professional development related to technology at some point in their career.

Instrument

Teachers' self-efficacy was measured using the CTISPE (Krause, 2017). The original Computer Technology Integration Survey (CTIS) was validated by Wang et al. (2004) and was designed to assess self-efficacy toward technology integration of classroom teachers and mainly incorporated vicarious experiences. Krause revised the survey to assess physical education pre/in-service teacher's self-efficacy toward technology integration and their level of success with the mastery, vicarious, and social persuasion experiences provided throughout their PETE program. (Krause, 2017). Krause renamed the survey, Computer Technology Integration Survey

for Physical Education (CTISPE). The CTISPE was used in the current study with permission from Krause. The survey included 16 questions regarding participants' present self-efficacy toward technology integration in physical education. For example, "I feel confident I understand technology capabilities well enough to maximize them in physical education" (CTISPE). Participants responded using a 5-point Likert scale (strongly disagree - strongly agree).

Following the present technology self-efficacy questions, participants were asked to rate their level of success with integrating technology in their PETE program based on their own experiences (mastery), others' experiences they observed (vicarious), and feedback relative to their ability to use technology (social persuasion). These experiences represent the three potential sources of self-efficacy. Participants responded using a 5-point Likert scale ranging from very unsuccessful to very successful; not applicable was also an option. Participants also noted the type(s) of technology training they received during their PETE program, which included: a single general technology course, a physical education specific technology course, infusion of technology throughout all methods courses, or none.

Finally, all participants were asked to answer questions related to their technology experiences as a teacher. Participants noted how recently they participated in professional development related to technology, how they find new technology, and what types of technology they have experience using in physical education.

Procedures

First, the CTISPE was entered into Qualtrics for use in this study. The survey was then piloted by a group of students and professors to ensure readability and usability. Then, all physical education teachers in the five school divisions, were sent an email explaining the purpose of the study and a link to the CTISPE. The survey was administered fully through

Qualtrics, beginning with an informed consent document that participants had to agree to in order to begin the survey. As surveys were completed by the participants, Qualtrics stored all data.

This project was approved by the Bridgewater College Institutional Review Board.

Data Analysis

Data was analyzed using SPSS Statistics (version 26). Descriptive statistics (mean and standard deviation) and inferential statistics (Pearson correlation, one-way ANOVA, and independent samples t-tests) were conducted.

Results

Descriptive Statistics

Participants' number of years teaching ranged from 1 – 41 years (M = 15.42, SD = 11.05). Participants were asked what type of technology preparation they had during their PETE program; they could choose all that applied. Type of technology preparation during PETE programs varied among participants, with 44.2% indicating a single general technology course, 36.5% indicating a physical education specific technology course, 32.7% indicating infusion throughout all methods courses, 11.5% indicating no technology preparation during their PETE program, and 19.2% indicating other. Out of the 52 participants who responded to this question, 18 (34.6%) indicated more than one type of preparation. Participants also indicated their level of success with integrating technology in their PETE program based on their own experiences (mastery), others' experiences they observed (vicarious), and feedback relative to their ability to use technology (social persuasion). These experiences represent sources of self-efficacy during participants' PETE programs. Of the 57 participants, 80.7% reported having mastery experiences

(*M* = 3.91, *SD* = .915), 80.7% reported having vicarious experiences (*M* = 3.80, *SD* =.859), and 77.2% reported experiencing social persuasion (*M* = 3.70, *SD* =.878).

Participants also indicated whether and how recently they participated in professional development related to technology. The majority of participants (63.5%) reported participating in some type of professional development related to technology within the past year. Nearly every participant (98.1%) reported having technology training at some point during their career.

Participants were asked to list all the ways they seek to learn about new technology related to physical education. Of the 57 participants, 43 responded to this question, producing 73 total responses which were coded into three categories: professional development (conferences, in-services, classes), peers (teachers, technology staff, Twitter, online forums), self-exploration (teachers exploring, researching, and searching on the internet). Of the participants, 31 noted that they seek technology information from professional development, 22 through their peers, 17 through self-exploration and 3 individuals indicated that they do not seek new technology. Participants selected the types of technology they use or have used in the past from a list. The majority of participants noted they had experience using activity trackers (70.2%), iPads (64.9%), video technology (59.6%), mobile device apps (56.1%), Excel (50.9%), and heart rate monitors (50.9%). Additionally, Coach's Eye accounted for 31.6% and 22.8% selected other.

Participants' present self-efficacy toward technology integration ranged from 1.81 to 4.94 (*M* = 3.77, *SD* = .642).

Inferential Statistics

A Pearson correlation ($r=-.16$, $p>.05$) revealed no significance between years teaching and present self-efficacy toward technology integration score. One-way ANOVAs revealed no significant difference in self-efficacy scores based on type of technology preparation during their

PETE program ($F(5, 49) = 1.087$, $p>.05$). Pearson correlations were conducted to evaluate how each of the sources of self-efficacy independently impacted present self-efficacy toward technology integration. Results revealed that mastery experiences and social persuasion experiences were significantly correlated with participants' present level of self-efficacy toward technology integration ($r=.484$ and $.421$ respectively, $p<.01$). Pearson correlation ($r = .119$, $p>.05$) revealed no significance between vicarious experiences and present self-efficacy toward technology integration.

Discussion

The ability to confidently use technology to enhance instruction is an important skill for HPE teachers (NSIPETE; SHAPE, 2017). The purpose of this study was to explore HPE teachers' self-efficacy toward technology integration in the physical education classroom in relation to prior training and technology experiences. Teachers reported their present levels of self-efficacy toward technology integration, length of teaching experience, type of technology preparation and sources of technology experience during PETE programs, and recent professional development. Findings revealed that mastery experiences and social persuasion during PETE programs may impact teachers' present self-efficacy toward technology integration in physical education. However, type of technology preparation during PETE programs and years of teaching experience did not predict teachers' present self-efficacy toward technology integration in physical education. The following section aims to shed light on these findings and the implications for future research.

Teaching Experience

Years of teaching experience made no difference in teachers' present self-efficacy toward technology integration in physical education. While the results do not explain why, one

explanation could be that technology changes quickly and any technology training during a PETE program could depreciate rapidly over time. Furthermore, opportunities for professional development related to technology are abundant, and could compensate for lack of preparation during PETE programs. These findings are consistent with Woods et al. (2008) who found that years of teaching experience did not have an impact on physical education teachers' perceptions of their ability to integrate technology in the physical education setting.

PETE Program Experiences

PETE program experiences were examined through two lenses: type of technology preparation (i.e. physical education specific technology course vs. technology integration throughout the curriculum) and type of experience or potential sources of self-efficacy (i.e. mastery, vicarious, and social persuasion). No specific way of learning about technology produced significant differences. Therefore, it seems that health and physical educators need some type of technology preparation, but it may not matter whether PETE programs offer courses that are specific to technology or whether they integrate technology in other ways throughout the PETE curriculum. Given that technology is so important in education, it is interesting that 11.5% of those who answered the question regarding technology in their PETE program indicated that they did not have technology training. This could be because of the amount of time since they were enrolled in a PETE program, but this study found no correlation between present self-efficacy toward technology integration and years teaching. It seems that some teachers could have had more of an opportunity during their teaching career to learn about technology. As teachers progress through their career, professional development and peers seem to matter more than their PETE experiences.

In regard to PETE experiences, findings showed that mastery and social persuasion experiences could predict present self-efficacy toward technology integration in physical education. In the context of this study, mastery experiences would include hands-on experience with integrating technology in the classroom during a PETE program and social persuasion would include feedback regarding a teacher candidate's ability to use technology. This complements a study done by Martin et al. (2008) that examined the influence of mentoring-based professional development opportunities on physical education teachers' computer and pedometer efficacy. These professional development opportunities allowed mentees to try using pedometers in their classes (mastery experience) and get feedback from their mentors on their level of success (social persuasion). Findings from the study showed that mastery experience paired with social persuasion increased the physical education teachers' self-efficacy to integrate technology in their classroom. These findings seem to indicate that individuals need hands-on experience and feedback regarding their success in order to further develop their present self-efficacy toward technology integration in physical education.

The significance of mastery experience in this study, complements Bandura (1997), "Enactive mastery experiences are the most influential source of efficacy information because they provide the most authentic evidence of whether one can muster whatever it takes to succeed" (p. 80). This finding is also consistent with previous studies that found mastery experiences influenced participants' perceptions of technology integration in the physical education setting. Krause (2017) found that all three sources of self-efficacy influenced PETE students' self-efficacy throughout a student teaching experience, with mastery experiences reported as most influential.

It is interesting that social persuasion was significant in this study, because some previous studies have found that vicarious experiences are stronger predictors of physical education teachers' self-efficacy toward technology integration in physical education (Wang et al., 2004). Baek et al. (2018) qualitatively examined teachers' perceptions of technology in physical education and found that their perceptions were influenced through hands-on learning with technology and by observing colleagues using technology. While Baek et al. (2018) explored perceptions rather than self-efficacy directly, hands-on learning with technology and observing colleagues are examples of mastery and vicarious experiences, respectively. Social persuasion was not a theme identified in Baek et al., potentially because in-service teachers have few opportunities for feedback from peers or supervisors. However, participants, in the current study were asked to reflect on their experiences in their PETE programs when answering questions regarding the sources of self-efficacy. Therefore, it seems sensible that mastery experiences in PETE programs could be accompanied by feedback (social persuasion) from PETE faculty regarding an individual's success with integrating technology. For example, PETE students could be provided the opportunity to peer teach a lesson using technology (mastery experience) and seek feedback from PETE faculty following the lesson (social persuasion).

Although students could benefit from mastery experiences and social persuasion in a PETE program, it is difficult to make any direct correlation between a teacher's present self-efficacy toward technology integration in physical education and their PETE experiences because of the number of years it has been since they completed a PETE program. In the case of this sample, the mean years of teaching was 15. Over the past 15 years, technology has evolved in various ways. In current PETE programs, preservice teachers are implementing technology in courses and student teaching (mastery experiences) and receiving feedback on their ability to

effectively use technology in the physical education setting (social persuasion). The current evaluation criteria require students to engage in these experiences, but 15 years ago this may not have been as important or even required (Council for the Accreditation of Educator Preparation [CAEP], 2019; SHAPE, 2017).

Professional Development Experiences

Although current teachers may or may not have had a lot of experience with technology during their PETE program, in this study, nearly every participant (98.1%) had professional development related to technology at some point in their career. This seems to indicate that teachers have been introduced to technology for education, but it does not reveal whether this technology was specific to the physical education setting. However, in a question regarding which types of technology teachers had learned how to use in physical education, the majority reported learning how to use activity trackers (70.2%), iPads (64.9%), video technology (59.6%), mobile device apps (56.1%), Excel (50.9%), and heart rate monitors (50.9%). This data seems to indicate that the majority of teachers have learned how to implement various technologies in the physical education setting, but there are still some who have not.

The data regarding how teachers find new technology revealed professional development (31), peers (22), and self-exploration (17) as key themes. These themes indicate that some teachers are seeking opportunities to implement technology in their physical education curriculum. Although professional development may be a requirement for teachers, these findings show that some teachers are engaging further with technology by seeking new ideas from peers and doing their own research. However, the number of teachers engaging in self-exploration is relatively low. The peers section surprised me, because only two participants reported using Twitter as a platform to gain new technology ideas for physical education. Twitter

has grown as a valuable professional resource for technology ideas for physical education, because it allows users to upload a video of activities and engage with those who upload content. During the COVID-19 worldwide pandemic, the HPE Twitter community has and continues to use technology to create and share countless activities for students and parents to engage in physical activity at home. Seeking out peers through Twitter and other avenues provides opportunities for vicarious experiences, but these experiences may or may not have an impact on teachers' self-efficacy toward technology integration in physical education. Based on this study, vicarious experiences seem to have little influence on self-efficacy toward technology integration in physical education. Therefore, individuals may still need mastery and social persuasion to impact their self-efficacy toward technology integration in physical education.

There was a large range in present self-efficacy toward technology integration in physical education scores among participants in this study. The mean score (M = 3.7) was relatively high, which seems to indicate most teachers feel mildly comfortable with integrating technology in their curriculum. The survey asked specific questions regarding teachers' current self-efficacy and the types of experiences they had in PETE programs. Therefore, it seems that participants' present self-efficacy toward technology integration in physical education could be impacted by some combination of experiences related to their current job, professional development, and their PETE program.

Limitations

This study had several limitations that should be noted. First, the study involved a small group of participants from one geographic area. Increasing the number of participants would increase the generalizability of the results. Second, the measurement tool that was used in this study measured sources of self-efficacy based on experiences in PETE programs. This was the

biggest limitation of the study, because it is difficult for current teachers to reflect on the experiences they had in their PETE programs, particularly if they have been teaching for many years. Therefore, there are too many confounding variables to make connections between PETE experiences and present self-efficacy toward technology integration in physical education.

Implications for Further Research

Technology is rapidly changing, so research in the area of physical education teachers' present self-efficacy toward technology integration in physical education is important. Currently, these findings have implications for the HPE program at Bridgewater College, as the program is currently under review by the Council for the Accreditation of Educator Preparation. Further research could be done to examine this topic more extensively. For example, a qualitative study could examine the purposes teachers have for using technology in their physical education classes. This would be meaningful because technology incorporated in the physical education setting should have a purpose. A study examining differences in self-efficacy scores after completing a series of specific professional development experiences could also be done to further identify which types of experiences have the most impact on present self-efficacy toward technology integration in physical education. Due to the lack of research on how teachers seek effective technologies, future research could explore this using self-efficacy theory. Using self-efficacy theory could reveal which avenue of seeking technology has the greatest influence on self-efficacy, potentially enabling teachers to use effective technology that promotes student learning. Students' perceptions of using technology in physical education could also be explored. It would be beneficial to discover whether students believe technology is upholding its purposes in physical education such as increasing student motivation and engagement as well as enhancing student learning.

Conclusion

The purpose of this research was to analyze HPE teachers' self-efficacy toward technology integration in the physical education classroom. Findings revealed that mastery experiences and social persuasion during PETE programs may impact teachers' present self-efficacy toward technology integration in physical education. Type of technology preparation during PETE programs and teaching experience did not predict teachers' present self-efficacy toward technology integration in physical education. Although the measurement tool was not a perfect measurement of the sources of self-efficacy for current physical education teachers, these findings still have implications for PETE programs, physical education teachers, and school divisions. Mastery experiences and social persuasion could be used in an attempt to increase present self-efficacy toward technology integration of PETE students or current teachers. Future research should analyze how teachers seek new technologies using self-efficacy theory, teachers' purposes for using technology in the physical education setting, and students' perceptions of technology in physical education. Due to current events, it would also be beneficial to examine how distance learning, which has forced physical education teachers to use technology, influences their self-efficacy toward technology integration in physical education.

References

Baek, J., Jones, E., Bulger, S., & Taliaferro, A. (2018). Physical education teacher perceptions of technology-related learning experiences: A qualitative investigation. *Journal of Teaching in Physical Education, 37*(2), 175-185. https://doi.org/10.1123/jtpe.2017-0180

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Casey, A., & Jones, B. (2011). Using digital technology to enhance student engagement in physical education. *Asia-Pacific Journal of Health, Sport and Physical Education, 2*(2), 51-66. https://doi.org/10.1080/18377122.2011.9730351

Council for the Accreditation of Educator Preparation. (2019, February). *2013 CAEP standards.* Retrieved from http://caepnet.org/~/media/Files/caep/standards/caep-standards-one-pager-0219.pdf?la=en

Gibbone, A., Rukavina, P., & Silverman, S. (2010). Technology integration in secondary physical education: Teachers' attitudes and practice. *Journal of Educational Technology Development and Exchange, 3*(1), 27–42. https://doi.org/10.18785/jetde.0301.03

Grand-Clement, S., Devaux, A., Belanger, J., and Manville, C. (Eds.). (2017). *Digital learning: Education and skills in the digital age.* RAND Corporation and Corsham Institute. https://www.rand.org/pubs/conf_proceedings/CF369.html

Juniu, S., Shonfeld, M., & Ganot, A. (2013). Technology integration in physical education teacher education programs: A comparative analysis. *Actualidades Investigativas en Educación, 13*(3), 218-240. https://doi.org/10.15517/aie.v13i3.12044

Koekoek, J. & van Hilvoorde, I. (Eds.). (2018). *Digital technology in physical education: Global perspectives*. London: Routledge. https://doi.org/10.4324/9780203704011

Krause, J. (2017). Physical education student teachers' technology integration self-efficacy. *Physical Educator, 74*(3), 476-496. https://doi.org/10.18666/TPE-2017-V74-I3-7329

Kuklick, C., & Harvey, S. (2018). Developing physical educators' knowledge of opaque and transparent technologies and its implications for student learning. In J. Koekoek & I. van Hilvoorde (Eds.), *Digital technology in physical education: Global perspectives* (pp. 147-163). Routledge. https://doi.org/10.4324/9780203704011

Lambert, C. (2016). Technology has a place in physical education. *Journal of Physical Education, Recreation & Dance, 87*(9), 58-60. https://doi.org/10.1080/07303084.2016.1227200

Laughlin, M. K., Hodges, M., & Iraggi, T. (2019) Deploying video analysis to boost instruction and assessment in physical education. *Journal of Physical Education, Recreation & Dance, 90*(5), 23-29. https://doi.org/10.1080/07303084.2019.1580637

Martin, J., McCaughtry, N., Kulinna, P., Cothran, D., & Faust, R. (2008). The effectiveness of mentoring-based professional development on physical education teachers' pedometer and computer efficacy and anxiety. *Journal of Teaching in Physical Education, 27*(1), 68-82. https://doi.org/10.1123/jtpe.27.1.68

Marttinen, R., Daum, D., Fredrick III, R. N., Santiago, J., & Silverman, S. (2019). Students' perceptions of technology integration during the f.i.t. unit. *Research quarterly for exercise and sport, 90*(2), 206-216. https://doi.org/10.1080/02701367.2019.1578328

Mohnsen, B. (2008). *Using technology in physical education* (6th ed.). Bonnie's Fitware.

Morgan Jr., C. F, Pangrazi, R. P., & Beighle, A. (2003). Using pedometers to promote physical activity in physical education. *Journal of Physical Education, Recreation & Dance, 74*(7), 33-38. https://doi.org/10.1080/07303084.2003.10609235

Partridge, J., King, K., & Bian, W. (2011). Perceptions of heart rate monitor use in high school physical education classes. *Physical Educator, 68*(1), 30-43. https://js.sagamorepub.com/pe/article/view/27

Roetert, E., Kriellaars, D., Ellenbecker, T., & Richardson, C. (2017). Preparing students for a physically literate life. *Journal of Physical Education, Recreation & Dance, 88*(1), 57-62. https://doi.org/10.1080/07303084.2017.1252554

Sargent, J., & Casey, A. (2018). Exploring pedagogies of digital technology in physical education through appreciative inquiry. In J. Koekoek & I. van Hilvoorde (Eds.), *Digital technology in physical education: Global perspectives* (pp. 69-85). Routledge. https://doi.org/10.4324/9780203704011

Scrabis-Fletcher, K., Juniu, S., & Zullo, E. (2016). Preservice physical education teachers' technological pedagogical content knowledge. *Physical Educator, 73*(4), 704-718. https://doi.org/10.18666/TPE-2016-V73-I4-6818.

Society of Health and Physical Educators (2017). *National standards for initial physical education teacher education.* Retrieved from https://www.shapeamerica.org/accreditation/upload/National-Standards-for-Initial-Physical-Education-Teacher-Education-2017.pdf

Society of Health and Physical Educators (2020). *What is physical education?* https://www.shapeamerica.org/publications/resources/teachingtools/teachertoolbox/explorepe.aspx

Sinelnikov, O. (2012). Using the ipad in a sport education season. *Journal of Physical Education, Recreation & Dance, 83*(1), 39-45. https://doi.org/10.1080/07303084.2012.10598710

Wang, L., Ertmer, P. A., & Newby, T. J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research in Technology in Education, 36*, 231–250. https://doi.org/10.1080/15391523.2004.10782414

Woods, M. L., Karp, G. G., Miao, H., & Perlman, D. (2008). Physical educators' technology competencies and usage. *Physical Educator, 65*(2), 82-99. https://js.sagamorepub.com/pe/article/view/2142

Wyant, J., Jones, E., & Bulger, S. (2015). A mixed methods analysis of a single-course strategy to integrate technology into PETE. *Journal of Teaching in Physical Education, 34*(1), 131-151. http://dx.doi.org/10.1123/jtpe.2013-0114

Appendix

Computer Technology Integration Survey

Background Information

Program (Please circle one): Bachelors / Masters / Other _____

College/University Name: _____

Year Graduated: _____

How many years have you been teaching? _____

What grade level do you teach? (Please circle one): Elementary Secondary

Technology Integration Self-Efficacy

The purpose of this survey is to determine how you feel about integrating technology into physical education. Technology Integration is defined as: using technology to support students as they construct their own knowledge through the completion of authentic, meaningful tasks. An example of technology integration is teachers and students using any of the following technologies to supplement physical education instruction: E-mail, electronic grade book, personal digital assistant (PDA), Internet/World Wide Web, desktop publishing, Power Point, desktop/laptop computer, digital watch, heart rate monitor, accelerometer, physical education software, music player, exergames (i.e. Dance Dance Revolution, WiiFit), electronic fitness equipment (treadmill, bike, etc.), GPS.

For each statement below, indicate the strength of your agreement or disagreement by circling one of the five scales.

I feel confident…	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. I understand technology capabilities well enough to maximize them in physical education.	SD	D	NA/ND	A	SA
2. I have the skills necessary to use technology for instruction.	SD	D	NA/ND	A	SA
3. I can successfully teach relevant subject content with appropriate use of technology.	SD	D	NA/ND	A	SA
4. In my ability to evaluate software for teaching and learning.	SD	D	NA/ND	A	SA

I feel confident…	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
5. I can use correct technology terminology when directing students' technology use.	SD	D	NA/ND	A	SA
6. I can help students when they have difficulty with technology.	SD	D	NA/ND	A	SA
7. I can effectively monitor students' technology use for project development in physical education	SD	D	NA/ND	A	SA
8. I can motivate my students to participate in technology-based projects	SD	D	NA/ND	A	SA
9. I can mentor students in appropriate uses of technology	SD	D	NA/ND	A	SA
10. I can consistently use educational technology in effective ways	SD	D	NA/ND	A	SA
11. I can provide individual feedback to students during technology use	SD	D	NA/ND	A	SA
12. I can regularly incorporate technology into my lessons, when appropriate to student learning	SD	D	NA/ND	A	SA
13. About selecting appropriate technology for instruction based on curriculum standards	SD	D	NA/ND	A	SA
14. About assigning and grading technology-based projects	SD	D	NA/ND	A	SA
15. About using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices.	SD	D	NA/ND	A	SA
16. I can be responsive to students' needs during computer use	SD	D	NA/ND	A	SA

Physical Education Teacher Education (PETE) Program Information

1. Directions: Please check the box that most describes your level of success with integrating technology for teaching and learning physical education during your physical education teacher education program.

Type of Experience	Very Unsuccessful	Moderately Unsuccessful	Neither Successful Nor Unsuccessful	Moderately Successful	Very Successful	Not Applicable
Your own, first-hand experiences						
Others (peers, instructors, teachers) experiences that you have observed						
Feedback that you have received regarding your capabilities to integrate technology into physical education						

2. In which of the following ways did you learn how to integrate technology in teaching physical education during your PETE program? Please circle all that apply.
    a. Single general technology course
    b. Physical education specific technology course
    c. Infusion throughout all methods courses
    d. Other (Please Describe):

    _____
    _____
    _____

3. What, if any, were the technology integration requirements and/or expectations for your student teaching experience?

    _____
    _____
    _____
    _____
    _____

4. How do you find new technology?

    _____

_____
_____

5. Have you had any professional development that included technology training?
    a. Yes, within last year
    b. Yes, within last three years
    c. Yes, more than three years ago
    d. No

6. What types/examples of technology have you learned how to use in teaching physical education?
    - iPads
    - Apps such as Coach's Eye
    - Excel
    - Video Technology
    - Mobile Device Apps
    - Heart Rate Monitors
    - Activity Trackers (pedometers, Fitbit, etc.)
    - Other (Please list below):