Improving Teachers' Self-Efficacy and Knowledge for Including Students with Disabilities in Physical Education through Online Learning

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ABSTRACT

Many students with disabilities are being included in the general physical education (PE) class. However, PE teachers consistently report not feeling adequately prepared for inclusion (see Obrusnikova & Block, 2016, for a review). As a result, additional training is needed for PE teachers to learn how to feel competent when including students with disabilities into their general PE class. One possible solution to providing additional training for inservice PE teachers is through the use of online education. Online learning can be an effective method in providing inservice PE teachers the opportunity to receive additional training at a time and location that is convenient for them (Healy et al., 2018). However, to date there have only been a handful of studies examining online training for inservice PE teachers. Therefore, the purpose of this experimental study was to determine the effectiveness of an online training module for modifying team sport activities for students with disabilities based on adult learning theory and Mayer's Cognitive Theory of Multimedia Learning. A pre/post design was used to measure the effectiveness of the online training module on knowledge and self-efficacy of PE teachers regarding the inclusion of students with disabilities into team sport activities in the general PE classroom. A total of 25 participants took a pretest to gauge knowledge of disabilities and modifications in PE and a pre self-efficacy survey before participating in the online training module. After completing the training module, participants once again took the knowledge test and the self-efficacy survey. A paired t-test was used to compare pre and post knowledge and self-efficacy scores. Results showed significant

improvements in posttest knowledge and post self-efficacy scores after participating in the training module, which provided support to the idea that online training can be effective at increasing teachers' knowledge and self-efficacy on how to teach PE to students with disabilities. While the results are positive, caution must be taken when generalizing the results due to the small sample size and the lack of a comparison control group. Further research, with a more rigorous study design, and a larger, more representative population, is needed to confirm these results.

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APPROVAL OF THE DISSERTATION

This dissertation "Improving teachers' self-efficacy and knowledge for including students with disabilities in physical education through online learning" has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Chapter 1

Introduction

During the 2014-2015 school year, the number of school-age children who received special education services in public schools in the United States was 6,600,000. This represents 13% of the total student population in the public-school system in the United States (National Center on Health, Physical Activity and Disability [NCHPAD], 2016). Reports from the National Center for Education Statistics (Snyder, de Brey, & Dillow, 2016), indicated that 62% of the special education population spent at least 80% of their school time in the general education setting, and placement in the general education setting most likely included placement in the general physical education (PE) class. In fact, the NCHPAD survey report (2016) indicated that 88% of students with disabilities participated in some form of PE and at least 80% participated in the general PE class. While federal law states that individuals with disabilities are to be included in the general education setting "to the maximum extent appropriate" (IDEA, 2004), and there are many benefits for students with disabilities to participate in the general PE class, many students with disabilities report not having a positive experience in the general PE class. Obrusnikova and Block (2016) reviewed the extant literature on the inclusion of students with disabilities in the general PE class from the perspective of the students with disabilities. Their findings highlighted three negative aspects of the inclusion experience according to students with disabilities. The first negative aspect of being included in the general PE setting for students with disabilities was that they reported feeling different

than their peers. Many times, this was because they were forced to participate in activities or settings that were different from the rest of the class. For example, they were placed off to the side of the gym and told to practice skills that did not match what the rest of the class was doing. In a qualitative study of 14 teenage students in Norway, Asbjørnslett and Hemmingsson (2008) reported that it was more important for the students with disabilities to be where the other students in the class were during PE than for them to be working on the same skills as students without disabilities. Being isolated from the other students in the class, or working on skills that were different from what the rest of the class was working on, only served to reinforce the differences between students with disabilities and students without disabilities.

The second negative aspect of the inclusion process for students with disabilities was that the students with disabilities did not perceive themselves as competent in PE activities. Students with disabilities were not able to perform the same skills as students without disabilities or were not able to perform the same skills at the same level as students without disabilities. This difference in ability may have led to frustration for the students without disabilities (Bredahl, 2013), and may cause the students with disabilities to feel less competent.

The third and final negative aspect of the inclusion process for students with disabilities was that the students with disabilities reported not having friends in the class. This was correlated, in part, to the other two negative aspects previously mentioned. Students that were isolated from the class and lacked the motor skills of the other students in the class did not have the same opportunities to socially interact with the other students in the class. In a qualitative study of 11 children with disabilities between the

ages of 8-12, Spencer-Cavaliere and Watkinson (2010) identified not having friends as a significant theme for why students with disabilities did not enjoy participating in the general PE class. Having friends played an important role in helping the students with disabilities feel included in the group.

A possible explanation for why students with disabilities reported not having positive experiences in the general PE class may be because PE teachers are not properly trained on how to include students with disabilities in PE. In fact, a significant amount of research has shown that most PE teachers report that they do not feel they are properly trained to include students with disabilities in the general PE class (Crawford, O'Reilly, & Flanagan, 2012; Fejgin, Talmor, & Erlich, 2005; Hodge et al., 2009; Jeong & Block, 2011; Jerlinder, Danermark, & Gill, 2010; Lieberman, Houston-Wilson, & Kozub, 2002; Lienert, Sherrill, & Myers, 2001; Mauerberg-deCastro et al., 2013; Meegan & MacPhail, 2006; Özer et al., 2013; Sato, Hodge, Murata, & Maeda, 2007; Vickerman & Coates, 2009). For example, Lirgg, Gorman, Merrie, and Shewmake (2017) surveyed 75 PE teachers regarding teacher preparation for including students with disabilities in PE. Fewer than half of the survey respondents felt their undergraduate training was sufficient to allow them to effectively accommodate students with disabilities in the general PE class. It is logical to reason that students with disabilities would report not having positive experiences in PE if PE teachers are not properly trained on how to include them in the general PE class.

One reason why PE teachers report not feeling adequately prepared to include students with disabilities in the general PE class is because most physical education teacher education (PETE) programs only require one introductory course on adapted

physical education (APE). In a study that looked at over 100 PETE programs, Piletic and Davis (2010) found that 69% of the PETE programs required only one course in APE. Similarly, Kwon (2018) surveyed faculty from 75 PETE programs and found that half of the programs required only one APE course. One certainly can question whether one introductory APE course provides sufficient knowledge and experience to provide PE teachers the skills to successfully include students with disabilities in their PE programs.

Numerous studies have confirmed that strong academic preparation is an important factor in a PE teachers' level of self-confidence in including students with disabilities in general PE (Elliott, 2008; Obrusnikova, 2008; Tripp & Rizzo, 2006). Teachers with higher levels of self-confidence are more willing to include students with disabilities in PE and have more positive attitudes toward including students with disabilities. Self-efficacy, a situational form of self-confidence (Bandura, 1997), is an important factor in PE teacher attitudes toward including students with disabilities.

Many studies have examined attitudes of PE teachers toward inclusion (for more detail see Tant & Watelain, 2016). Most studies have found that PE teachers overwhelmingly agree that students with disabilities should be included in the general PE class, and most PE teachers have positive attitudes toward including students with disabilities in PE. While research shows that teachers have positive attitudes toward including students with disabilities in the general PE class, as noted earlier, research is also clear that teachers do not feel they are properly trained to include students with disabilities. As a result of this lack of preparation, PE teachers reported they lacked confidence in their abilities to include students with disabilities into their general PE

classes. That begs the question, what can be done to help teachers feel more confident including students with disabilities in the general PE class?

One potential solution is for PETE programs to require more than one introductory course in APE. Unfortunately, PETE programs are limited in the number of credits they can require for their program, and adding additional APE courses would be difficult to require of PETE programs. Another potential solution would be to infuse concepts of APE throughout the entire PETE programs. Rather than have one course dedicated solely to APE, PETE programs could infuse concepts of APE into all of the other curriculum courses in the PETE program. For example, when learning about how to write lesson plans in elementary and secondary methods courses, part of the lesson planning process would include planning lessons or adapting lessons for students with disabilities. Research has shown that PETE programs report infusing concepts of APE throughout the PETE program (Kwon, 2018), but no research has been done to show how that infusion is taking place, what exactly is being infused (e.g., how to include students with disabilities in PE), who is leading the infusion effort (the person who is teaching the APE course in the department and/or PETE faculty), or if it is making any difference for the PE teachers.

Even if more APE courses were added to the PETE program, or if APE concepts were infused throughout other courses in the PETE program, this would not help solve the problem facing inservice PE teachers, or those teachers that are no longer in college but are teaching PE in the schools. Yet, there is evidence that inservice PE teachers also need more information on how to include students with disabilities into their PE classes. A possible solution for providing additional training to inservice PE teachers is through

continued education. Continued education has been suggested as a way to fill in the gaps left from undergraduate teacher training. It can also provide professional development opportunities for inservice PE teachers (Sato & Haegele, 2017). One way to provide continuing education for inservice PE teachers is through the use of online education. Online education, while not empirically better than face-to-face learning, has been shown to be just as effective for learning as the traditional classroom setting (Smith, Smith, & Boone, 2000). Furthermore, many inservice teachers prefer online education because of the many benefits it offers (Healy, Block, & Judge, 2014). Some of the benefits of online education include flexibility, cost, and greater learning opportunities. For example, through an online class a student may have access to experts throughout the country, or may be able to interact with students they normally would not have the opportunity to interact with in a face-to-face setting.

However, just because something is labeled as "online" education does not make it effective. In order for online education to be effective it must be based on evidence-based theory and logic. Because online education as a form of continued education for inservice teachers is traditionally used with adult learner populations, it must be developed based on how adults learn. Adult learners require a different way of learning than child learners (Knowles, 1989). Andragogy, or adult learning theory, explains how adults learn differently than children (Knowles, 1968). Important components of adult learning theory are that adults need to be in control of the learning, adults have a wealth of experience from which to solve problems, adult learners are interested in learning relevant information that will immediately help them solve problems they are dealing with, and adult learners have different motives for learning (Knowles, 1989). Sound

professional development for adult learners should be developed around these components of adult learning theory.

Learning how to create education for an adult population is one key component of developing appropriate online education for inservice teachers. Because online education is delivered through a technology medium, another important component is the use of appropriate methods for developing content using technology. One evidence-based theory for the creation of online education is Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2009). Mayer's theory revolves around cognitive learning theory and is based on three assumptions about cognitive learning. First, humans possess visual channels and auditory channels for processing information. Second, humans have a limited capacity for the amount of information that each channel can process at one time, and third, humans engage in active processing. From these three assumptions, Mayer created 12 research-based principles of multimedia learning that can be used to design effective multimedia learning.

The creation of effective online education may have the potential to assist PE teachers with including students with disabilities in the general PE class, but it is not a panacea for ineffective teacher preparation. The reasons for teachers not being able to successfully include students with disabilities in PE are too numerous to be solved by creating an online training module that addresses just one small strategy for including students with disabilities in PE. In order for PE teachers to feel more confident in their teaching, numerous online training modules would need to be created that address a number of APE-related concepts (e.g., assessment, IEP, lesson planning, etc.). It is not possible to provide sufficient training in one online training module to make up for the

lack of teacher preparation expressed by inservice PE teachers. However, the use of online education may be one solution to assist inservice PE teachers with including students with disabilities in the general PE class.

Problem Statement

A significant portion of students with disabilities are being included in the general PE class. However, PE teachers consistently report not feeling adequately prepared to include them. Additional training is needed for PE teachers to feel competent including students with disabilities in the general PE class. One possible solution to providing additional training for inservice PE teachers is through the use of online education. Online learning has proven to be as effective or more effective than traditional learning, and it provides inservice teachers the opportunity to receive additional training at a time and location that is convenient for them. Online education, though, is only useful if it is designed effectively. Knowles' theory of adult learning (andragogy) explains how adults learn differently from children and provides a framework for how to design learning opportunities for adults. Mayer's multimedia theory provides the framework for designing effective instruction using technology. These two theories have been used successfully in other studies to design effective online learning for teachers, but the use of effective online education for inservice PE teachers is extremely limited. Further research is needed to determine if online education can be effective for inservice PE teachers when it comes to including students with disabilities in the general PE class.

Purpose Statement

The purpose of this experimental design study was to determine the effectiveness of an online training module (focusing on one small, but important, aspect of inclusion in

PE) for modifying team sport activities for students with disabilities. Specifically, the purposes of the study were: (a) to determine if the online training module significantly improved the content knowledge of inservice PE teachers related to including students with disabilities in team sport activities within the general PE setting, and (b) to determine if the online training module significantly improved the self-efficacy levels of inservice PE teachers related to including students with disabilities in team sport activities within the general PE setting before and after participating in an online training module.

Research Questions

Research Question #1

Does the online training module increase inservice PE teachers' content knowledge regarding including students with disabilities in team sport activities in the general PE class?

Research Question #2

Does the online training module increase inservice PE teachers' self-efficacy regarding including students with disabilities in team sport activities in the general PE class?

Definition of Key Terms

Within the context of this study, the following definitions were used:

Andragogy. Knowles' (1980) theory on adult learning that translates to "the art and science of helping adults learn."

Multimedia instruction. Mayer's (2009) theory on the presentation of words and pictures intended to foster learning.

Limitations

A major limitation of this study was that it did not measure the ability of the PE teacher to implement what was learned in the online training module into real teaching opportunities. To account for this inability to measure application, opportunities were provided within the training module for teachers to demonstrate their knowledge and ability to apply the concepts in real-life scenarios. However, these checks do not fully replace the ability to gather actual data on the application of these principles and concepts in a PE setting.

Another limitation of this study was that it was limited to a few team sport activities. Realizing that including students with disabilities in team sports may not be appropriate for every student with a disability, team sports were chosen because they are a major component of the secondary PE curriculum, and because students with disabilities are included in the general PE class. It is probable that most general PE teachers will have students with disabilities included in their general PE classes, which typically involve team sport activities.

Finally, this study provided information on only three disabilities (i.e., intellectual disability, physical disability, visual impairment). These disabilities were chosen because they are commonly found in the general school setting and they matched the validated self-efficacy survey, but do not cover the complete range of disabilities a PE teacher might encounter in a general PE class.

Chapter 2

Literature Review

The main goal of this study was to determine if the use of an online training module was effective at increasing knowledge and self-efficacy of inservice PE teachers regarding the inclusion of students with disabilities in team sport activities in the general PE setting. This review examined the extant literature related to the use of online education for inservice PE teachers. This literature review was divided into two main sections. The first section began with a systematic review of the literature regarding the undergraduate preparation PE teachers receive for teaching PE to individuals with disabilities, the attitudes and beliefs of PE teachers toward including students with disabilities in PE, and PE teacher self-efficacy toward inclusion of students with disabilities in PE. The second section of this literature review examined the theory regarding adult learning, the literature regarding the creation of online learning, and the use of online learning with adult learners in the field of education, specifically physical education.

PE Teacher Training, Attitudes, and Self-Efficacy Toward Including Students with Disabilities in PE

The first section of this review of literature encompassed a systematic review of literature that identified relevant research regarding: (a) perceived undergraduate preparation towards including children with disabilities into general PE, (b) attitudes and beliefs of PE teachers on including students with disabilities into the general PE class,

and (c) the self-efficacy of PE teachers on their ability to include students with disabilities into the general class. Recommendations for PE teacher education programs were provided to assist in aligning teacher preparation programs with what is known in the literature.

Method

Procedures for identifying articles. An electronic search was conducted to identify all articles published in English during the past 20 years that discussed PE teacher preparation, attitudes of PE teachers toward inclusion, and/or self-efficacy of PE teachers to include students with disabilities in the general PE class. Guided by the protocol used to select articles in the review of literature by Block and Obrusnikova (2007), to be included in this review of literature articles must have met the following criteria: (a) articles must have been published between January, 1998 and July, 2018, (b) only articles published in the English language were permitted, (c) all articles must have been published in peer-reviewed journals (studies located in books or unpublished papers like doctoral dissertations and master's theses were not included), (d) studies must consist of research conducted in the field (studies validating surveys or conducted in laboratories were not included), and (e) studies must focus on preservice PE teachers or inservice PE teachers.

Article search. Using the SPORTDiscus Index, an electronic search was conducted during the summer of 2018 to identify all articles published in peer-reviewed journals since January, 1998, dealing with the topics of attitudes, teacher preparation, and self-efficacy of PE teachers toward including students with disabilities in PE. The keywords searched were "physical education," "inclusion," "attitudes," "self-efficacy,"

"disabilities," and "teacher training." These keywords were used in different combinations in order to identify all articles that met the selection criteria, and that discussed the three main themes of the literature review (i.e., teacher preparation, attitudes, self-efficacy). A total of 38 articles were identified that met the selection criteria. Additionally, a thorough search of the reference list of each article resulted in four additional articles meeting the selection criteria, bringing the total number of articles to 42 (see Table 1 for a complete list of the articles).

Table 1

Systematic Review of Literature Chart

Author	Research Method	Participants (In/pre)	N	Instrument
Bartak, L., & Fry, J. (2004).	Quant	Inservice	60	Self-created survey
Beamer, J. A., & Yun, J. (2014).	Quant	Inservice	142	PESEISD-A, Survey
Coates, J. K. (2012).	Qual/Quant	Preservice	107	Self-created survey
Collier, D., & Hebert, F. (2004).	Quant	Inservice	359	Self-created survey
Crawford, S., O'Reilly, R., & Flanagan, N. (2012).	Qual	Preservice	4	Interviews, Questionnaire
DiNardo, M., Kudláček, M., Tafuri, D., & Sklenaříková, J. (2014).	Quant	Preservice	223	ATIPDPE
Elliott, S. (2008).	Quant	Inservice	20	PEATID-II
Folsom-Meek, S. L., Nearing, R. J., Groteluschen, W., & Krampf, H. (1999)	Quant	Preservice	2943	PEATID-III PS
Fournidou, I., Kudlacek, M., & Evagellinou, C. (2011)	Quant	Inservice	100	ATIPDPE-GR
Hardin, B. (2005).	Qual	Inservice	5	Interviews, observations
Hersman, B. L., & Hodge, S. R. (2010).	Qual	Inservice	5	Interviews, Questionnaire
Hill, G., & Brodin, K. L. (2004).	Quant	Inservice	132	Self-created survey

Hodge, S. R., Ammah, J. O. A., Casebolt, K. M., LaMaster, K., Hersman, B., Samalot-Rivera, A., & Sato, T. (2009).	Qual	Inservice	29	Interviews
Hodge, S., Ammah, J., Casebolt, K., Lamaster, K., & O'Sullivan, M. (2004).	Qual	Inservice	9	Interviews, Questionnaire
Hodge, S. R., Davis, R., Woodard, R., & Sherrill, C. (2002).	Quant	Preservice	37	PEATID-III
Hodge, S. R., & Elliott, G. (2013).	Quant	Preservice	177	PEJI
Hodge, S. R., & Jansma, P. (1999).	Quant	Preservice	474	PEATID-III
Hutzler, Y., Zach, S., & Gafni, O. (2005).	Quant	Preservice	153	ATIPE, SEIPE
Jeong, M. (2013).	Quant	Preservice	106	Self-created survey
Jeong, M., & Block, M.E. (2011).	Quant	Preservice	220	Self-created survey
Jerlinder, K., Danermark, B., & Gill, P. (2010).	Quant	Preservice	221	Self-created survey
Ko, B., & Boswell, B. (2013).	Qual	Inservice	7	Interviews, journals
Lieberman, L.J., Houston-Wilson, C. & Kozub, F. (2002).	Quant	Inservice	148	Self-created survey
Lienert, C., Sherill, C., & Myers, B. (2001).	Qual	Inservice	30	Interviews, CBAM
Lirgg, C. D., Gorman, D. R., Merrie, M. D., & Shewmake, C. (2017).	Quant	Inservice	75	Self-created survey
Martin, K., & Kudláček, M. (2010).	Quant	Preservice	230	ATIPDPE-R
Mauerberg-deCastro, E., Paiva, A.C.S, Figueiredo, G.A., Costa, T.D.A., Castro, M.R., & Campbell, D.F. *(*2013).	Quant	Both (20pre, 75 in)	95	Self-created survey
Meegan, S., & MacPhail, A. (2006).	Quant	Preservice	25% PE teachers in Ireland	PEATID-III

Morley, D., Bailey, R., Tan, J., & Cooke, B. (2005).	Qual	Inservice	43	Interviews
Obrusnikova, I. (2008).	Quant	Inservice	168	PEATID-III
Ogu, O. C., Umunnah, J. O., Nwosu, K. C., & Gloria, I. C. (2017).	Quant	Inservice	67	Adapted PEATH
Özer, D., Nalbant, S., Ağlamış, E., Baran, F., Samut, P. K., Aktop, A., & Hutzler, Y. (2013).	Quant	Inservice	729	TACIDS
Park, S. S., Koh, Y., & Block, M. (2014).	Quant	Inservice	24	AHP
Petkova, A., Kudláček, M., & Nikolova, E. (2012).	Quant	Preservice	120	ATIPDPE-BG
Sato, T., Hodge, S. R., Casebolt, K., & Samalot-Rivera, A. (2015).	Qual	Preservice	10	Interviews, journals
Sato, T., Hodge, S. R. Murata, N. M., & Maeda, J. K. (2007).	Qual	Inservice	5	Interviews
Smith, A., & Green, K. (2004).	Qual	Inservice	7	Interviews
Taliaferro, A. R., Hammond, L., & Wyant, K. (2015).	Quant	Preservice	98	PESEISD-A, SSSI-PETE
Taliaferro, A., & Harris, N. P. (2014).	Quant	Both (pre-38, in-27)	65	PESEISD-A
Tripp, A., & Rizzo, T. L. (2006).	Quant	Inservice	68	PEITID
Vickerman, P. & Coates, J., (2009).	Mixed	Both (pre-202, in-19)	221	Questionnaires
Wang, L., Qi, J., & Wang, L. (2015).	Quant	Inservice	195	PEATID-III

PE Teacher Training

A number of studies have confirmed that PE teachers do not feel that their undergraduate teacher training was sufficient to adequately prepare them to include students with disabilities in the general PE class (Folsom-Meek, Nearing, Groteluschen, & Krampf, 1999; Hersman & Hodge, 2010; Hodge, Ammah, Casebolt, Lamaster, & O'Sullivan, 2004; Ko & Boswell, 2013; Lirgg, et al., 2017; Smith & Green, 2004;). In

most instances, only one course on teaching PE to students with disabilities was provided to preservice PE teachers (Piletic & Davis, 2010). Frequently, this course was not taught by a highly qualified instructor (Piletic & Davis, 2010). This lack of adequate preparation is not limited to students in the United States, but exists in many countries throughout the world (Bartak & Fry, 2004; Coates, 2012; Crawford, 2011; DiNardo, Kudláček, Tafuri, & Sklenaříková, 2014; Fejgin et al., 2005; Jerlinder et al., 2010; Lienert et al., 2001; Mauerberg-deCastro et al., 2013; Meegan & MacPhail, 2006; Morley, Bailey, Tan, & Cooke, 2005; Ogu, Umannah, Nwosu, & Gloria, 2017; Özer et al., 2013; Petkova, Kudláček, & Nikolova, 2012; Sato et al., 2007; Smith & Green, 2004; Vickerman & Coates, 2009; Wang, Qi, & Wang, 2015). Additionally, this lack of preparation is not limited to a specific type of disability (Beamer & Yun, 2014; Lieberman et al., 2002). Many researchers have recommended that more training is needed in teacher preparation programs to sufficiently train preservice PE teachers on including students with disabilities in the general PE class (Block, Kwon, & Healy, 2016; Hardin, 2005; Hodge, Davis, Woodard, & Sherrill, 2002; Jeong, 2013; Özer et al., 2013; Tripp & Rizzo, 2006).

Undergraduate preparation. Academic training for PE teachers occurs in college through undergraduate PETE programs. According to Hill and Brodin (2004), the ultimate goal for these PETE programs should be to produce effective, highly competent teachers. This undergraduate preparation in PE includes training for including students with disabilities in PE (known as Adapted Physical Education, or APE) (Piletic & Davis, 2010). Lirgg et al. (2017) analyzed the challenges facing PE teachers regarding inclusion from the perspective of the university professors. In their study of 74 PETE

programs the authors found that 80% of the PETE programs offered at least one APE class. Interestingly, only 52% of the instructors of these PETE programs reported that they felt their students' preparation was sufficient to adequately include students with disabilities in PE. Lirgg et al. also looked at undergraduate training preparation from the perspective of inservice PE teachers (i.e., those that have already graduated and are teaching in the field). A total of 75 PE teachers responded to a survey about teacher preparation and less than half of the PE teachers felt they had enough knowledge and preparation to effectively accommodate students with disabilities into the general PE class. A similar study looking at attitudes of PE teachers toward inclusion from the perspective of the PE teacher by Hill and Brodin (2004) surveyed 132 PE teachers in the state of Washington. The authors reported that 88% of the PE teachers in their study said that training in APE was part of their PETE program, but nearly half of the respondents (46%) reported moderate or extreme difficulty working with individuals with special needs. This would appear to indicate that the undergraduate training did not adequately prepare them to work with individuals with disabilities. It is important to note that this survey was confined to only one state (i.e., Washington) which made it difficult to generalize to PE teachers in other states. Additionally, if most of the PE teachers from the state received their training from the same limited number of PETE programs, it may be that the problem lies only with one or two PETE programs in that state.

University PETE faculty and current PE teachers are not the only ones that believe more undergraduate training is needed to effectively include students with disabilities in PE. Hodge and Elliott (2013) surveyed 177 college students (including 147 PETE majors) in eight universities in North Carolina. Results from their study led them

to conclude that, "it is interesting to note that most participants believed they needed more and better training to acquire knowledge and skills before feeling confident teaching students with disabilities" (p. 155). The researchers further argued that the lack of adequate training perceived by the college students would have a negative impact on their willingness to include students with disabilities into their PE classes. Similar to Lirgg et al. (2017), this study focused on one state, so generalization to other states was limited.

Introductory APE course. A common complaint found among university faculty, inservice PE teachers, and pre-service PE teachers is that their undergraduate training did not adequately prepare them to successfully include students with disabilities in PE. It is important to analyze the current state of the teacher preparation in order to identify areas for improvement. Most undergraduate PETE programs only require one introductory course in APE as part of their PE teacher preparation programs (Piletic & Davis, 2010). In a study performed by Hetland and Strand (2010), a thorough description of 44 PETE programs in the Central District (SHAPE America) was examined. Gratefully, every institution reported that APE was part of their PETE program. In 93% of the PETE programs APE was taught as either a stand-alone course, or taught as a stand-alone course and infused in other courses throughout the program. The remaining 7% reported that APE concepts were infused throughout the program, but no specific course was dedicated solely to APE. Similar results were found in a study by Taliaferro, Ayers, and Housner (2017). A total of 156 PETE programs were surveyed with 96% reporting that APE coursework was included as part of the PETE program and 91% of the programs also infuse APE into other academic courses. The survey conducted by

Taliaferro et al. has the advantage of being sent to over 600 undergraduate PETE programs and responses were gathered from 44 different states. While a random sample was not used, the differences between the PETE programs in terms of size, location, and program emphasis made the results more generalizable.

Perhaps the most impactful study that looked at undergraduate training in APE was conducted by Piletic and Davis (2010). The researchers surveyed 129 universities representing 41 states. They found that 69% of the universities offered only one undergraduate course in APE and 31% of the programs offered more than one APE course. Sadly, less than half the faculty members teaching the APE course (48%) had a terminal degree (i.e., Ph.D. or Ed.D.) in APE. This means that, more often than not, the person teaching the introductory APE course to future PE teachers may not be highly qualified to teach the APE course. A more recent study looking at the undergraduate training in APE was conducted by Kwon (2018) and found similar results. In this study, 75 university APE professors representing 31 states completed a descriptive survey about the APE courses taught in their university's PETE programs. Of the 75 respondents, 38 stated they had one course in APE while 31 programs offered two or more APE courses. The APE course was a required course in only 70% of the PETE programs. Kwon also looked at the faculty teaching those APE courses and found that 75% of the instructors had a Ph.D or Ed.D with 77% of those degrees being in the field of APE and the remaining 23% coming from the field of PE. While these results are encouraging, and they show that improvements are being made regarding teacher training in APE, there is still work to be done to ensure that the professors tasked with teaching the APE courses to undergraduate PETE students are highly qualified to do so. Consistent with these

results that instructors of APE courses should be trained in APE, Beamer and Yun (2014) stated, "If we consider the quality of undergraduate and graduate APE coursework is key…faculty who specialize in APE should be teaching the classes" (p. 12).

Disability type. The studies previously mentioned clearly indicate that current PE teacher preparation for including students with disabilities in the general PE class is insufficient. Limited research also suggested that the type of the disability or the nature of the physical activity played no significant role in increasing teacher's preparedness for inclusion (Lirgg et al., 2017). Studies have shown that teacher preparation has been deemed inadequate for including students with visual impairments (Lieberman et al., 2002), students with autism (Beamer & Yun, 2014; Lirgg et al., 2017), and students with severe disabilities (Hodge et al., 2009). In addition, teachers providing instruction in adapted aquatics also expressed a lack of teacher preparation for including students with severe disabilities in adapted aquatic activities (Sato, Hodge, Casebolt, & Samalot-Rivera, 2015).

Lieberman et al. (2002) surveyed 148 PE teachers in New York and Minnesota to determine barriers to including students with visual impairments in PE. Each of the responding PE teachers reported having previously worked with a student with a visual impairment in PE. The PE teachers reported that the lack of professional preparation was considered the most prevalent barrier to including students with visual impairments in PE. Using a stratified national random sample, Beamer and Yun (2014) investigated the undergraduate training of PE teachers towards including students with autism spectrum disorder (ASD) in PE. Of the 142 participants that responded to the survey, 42% felt that they were not at all prepared to include students with ASD in PE. Sadly, only 12% of the

PE teachers reported that they were very well prepared to include students with ASD in PE. However, researchers agreed that the severity of the disability affected how prepared teachers felt when including students with disabilities in PE (Hersman & Hodge, 2010; Hodge et al., 2004; Lirgg et al., 2017; Sato et al., 2015). For example, Hodge et al. (2004) conducted a naturalistic inquiry survey with nine secondary PE teachers and found that seven of the nine teachers did not believe their PETE training adequately prepared them to include students with severe disabilities. A lack of teacher preparation on including students with severe disabilities was also reported by Sato et al. (2015). In an explanatory case study involving 10 PETE majors enrolled in an APE course with adapted aquatics practicum, the PETE majors reported not feeling satisfactorily prepared to teach students with severe disabilities. Note that both of these studies were self-reported as exploratory with small sample sizes, so broad generalizations to the PE teacher population should be made cautiously. Clearly, more research is needed in these areas to determine if the type of disability or the type of activity affect teacher attitudes toward including students with disabilities in PE.

Worldwide teacher training. It is clear from the literature that PE teachers in the United States do not feel that the teacher preparation to include students with disabilities that they received in their PETE program was sufficient. Sadly, but perhaps not unexpectedly, this perceived lack of preparation is not limited to the United States. In fact, PE teachers from Australia (Bartak & Fry, 2004), Brazil (Mauerberg-deCastro et al., 2013), Bulgaria (Petkova et al., 2012), China (Wang et al., 2015), England (Coates, 2012; Morley et al., 2005; Smith & Green, 2004; Vickerman & Coates, 2009), Germany (Lienert et al., 2001), Ireland (Crawford, 2011; Meegan & MacPhail, 2006), Israel

(Fejgin et al., 2005), Italy (DiNardo et al., 2014), Japan (Sato et al., 2007), Nigeria (Ogu et al., 2017), Sweden (Jerlinder et al., 2010), and Turkey (Özer et al., 2013) have all expressed similar concerns that they are not prepared to include students with disabilities into the general PE class. Perhaps this is not surprising as the concept of including students with disabilities in the general education setting is relatively new for most of these countries.

In a study aimed at examining the views and opinions of recently qualified PE teachers (i.e., recently graduated from a PE teacher preparation program and two years teaching experience in the schools) in England, Vickerman and Coates (2009) reported that 84% of the recently qualified PE teachers did not feel their initial teacher training had sufficiently prepared them to work with children with disabilities in the general PE class. Another study from England, this one a qualitative study of seven PE teachers, found that the PE teachers' lack of confidence on including students with disabilities came from the inadequate training they received in their teacher preparation program. Meegan and MacPhail (2006) looked at teacher training in Ireland and concluded that, "We cannot expect our physical educators to have a genuine commitment towards teaching students with special educational needs when we are failing to prepare them with the necessary skills and knowledge on how to do so" (p. 89).

PE Teacher Attitudes and Beliefs

One area of research that has received considerable attention over the years is the attitude of PE teachers toward including students with disabilities into the general PE class. In fact, over the past 20 years a number of literature reviews have been published looking specifically at PE teacher attitudes toward inclusion (Avramidis & Norwich,

2002; Block & Obrusnikova, 2007; Hutzler, 2003; Kozub & Lienert, 2003; Tant & Watelain, 2016; Wilhelmsen & Sørensen, 2017). Most research on the attitudes of PE teachers showed that the majority of PE teachers agreed that students with disabilities should be included in the general PE class (Coates, 2012; Martin & Kudláček, 2010), and that PE teachers had favorable attitudes about including students with disabilities in PE (Coates, 2012; Fournidou, Kudláček, & Evagellinou, 2011; Ko & Boswell, 2013; Mauerberg-deCastro et al., 2013). However, differences existed in the attitudes of the PE teachers based on both characteristics of the student with a disability (e.g., severity of disability, disability type) and characteristics of the PE teacher (e.g., teaching experience, prior experience, gender). Regardless of the characteristic differences of both the teachers and the students, the attitude of the PE teacher toward including students with disabilities in PE is an important factor in how well the student with a disability is included in PE (Heikinaro-Johannson & Sherrill, 1994).

Severity and type of disability. PE teachers have consistently reported that the severity of a student's disability is an influencing factor in attitudes and competence toward including students with disabilities in PE (Hersman & Hodge, 2010; Hodge et al., 2004; Wang et al., 2015). For example, Hodge et al. used naturalistic inquiry when interviewing nine secondary PE teachers about their beliefs regarding including students with disabilities in PE. Nearly all of the PE teachers (n=8) admitted that students with the most severe disabilities were the most challenging to teach. Using an explanatory case study design to interview five PE teachers in Ohio, Hersman and Hodge (2010) found that the severity of the disability mattered to the PE teacher with those students with more severe disabilities being harder to teach than those students with mild

disabilities. Both of these studies showed similar results, but with such a small sample size the results must be regarded with caution.

While it appears that the severity of the disability affects PE teacher attitudes toward including students with disabilities in PE, research also made clear that the type of disability was an influencing factor. Rizzo and Vispoel (1992) surveyed 174 PE students and found that individuals with a label of behavior disorder were viewed less favorably than those with a label of EMR-educable mentally retarded (which is now classified as intellectual disability). Similarly, both Morley et al. (2005), and Lirgg et al. (2017) reported that individuals with behavior problems were the most difficult to include, while those with learning disabilities were the least difficult. Interestingly, a study by Tripp and Rizzo (2006) found that just attaching a disability label to a student was enough to change PE teacher attitudes toward including that student in PE. In their study, 68 PE teachers were surveyed about their attitudes toward inclusion. The PE teachers in the study were randomly assigned to one of two groups. Both groups were provided a vignette about a student, but in one group the label "has cerebral palsy" was added while the label "has cerebral palsy" was not added to the vignette for the second group. The results of the study indicated that those PE teachers that had the vignette with the label "has cerebral palsy" had less favorable attitudes toward inclusion than those PE teachers whose vignette did not have the label attached.

Teaching experience of teacher. While the characteristics of the student with a disability appears to affect PE teachers' attitudes toward including students with disabilities in PE, research has also shown that certain characteristics of the PE teacher affect attitudes as well. One teacher characteristic that has received attention in the

research is the teaching experience of the PE teacher. Jerlinder et al. (2010) surveyed 221 PE teachers in Sweden and found that younger teachers had more positive attitudes toward inclusion than older teachers. Similarly, more positive attitudes in younger teachers were found in a random sampling of 729 secondary PE teachers in Turkey (Özer et al., 2013) when compared to older teachers. Also of note in this study, was the finding that teachers with less teaching experience had more positive attitudes toward including students with disabilities in PE than teachers with more teaching experience. This appears to contradict most research that indicated experience with individuals with disabilities was a key factor in positive teacher attitudes (Folsom-Meek et al., 1999; Hodge & Jansma, 1999; Jerlinder et al., 2010).

Prior experience. In the previously mentioned study about PE teachers in Sweden by Jerlinder et al. (2010), PE teachers with previous experience with individuals with disabilities had more favorable attitudes than those without previous experience. Similar results regarding positive attitudes due to previous experience with individuals with disabilities have been found by Özer et al., (2013), Hodge and Jansma (1999), and Folsom-Meek et al. (1999). In contrast, DiNardo et al. (2014), Meegan and MacPhail (2006), and Ogu et al. (2017) all found that previous experience with individuals with disabilities was not a factor in PE teacher attitudes. The studies that found a relationship between previous experience and positive attitudes used significantly larger sample sizes compared to those studies that found no relationship. Additionally, all of the studies that found no relationship were conducted with preservice PE teachers outside of the United States compared to only half of the studies that did find a positive relationship.

Teacher gender. Another teacher characteristic that similarly divides researcher opinions is teacher gender. A number of studies show that there are no differences in attitudes toward inclusion based on the gender of the teacher (Jerlinder et al., 2010; Meegan & MacPhail, 2006; Ogu et al., 2017; Özer et al., 2013). It must be pointed out that each of the studies described the attitudes of teachers outside the United States (i.e., Sweden, Ireland, Nigeria, Turkey). Many more studies however, indicated that there was a difference in attitudes between genders, with females displaying more positive attitudes toward including students with disabilities in PE than males (DiNardo et al., 2014; Folsom-Meek et al., 1999; Hodge & Jansma, 1999; Hutzler, Zach, & Gafni, 2005). Folsom-Meek et al. (1999) surveyed nearly 3,000 APE students from over 190 institutions and found females have more positive attitudes. The authors noted the conflicting evidence about gender and attitudes and claimed that the results of their study were more generalizable due to the large nature of their sample size (N=2,943), which was significantly larger than the sample sizes for other similar studies looking at gender differences. It is worth noting that each of the studies that found no differences between genders dealt with the attitudes of inservice PE teachers (i.e., those teaching in the field), while the studies that found differences between the genders dealt with preservice PE teachers (i.e., those still in school). Perhaps once PETE students become PE teachers and gain meaningful experience working with individuals with disabilities, their attitudes toward including students with disabilities in PE become more positive.

PE Teacher Self-efficacy

Along with proper teacher training and a positive attitude toward including students with disabilities, successful PE teachers must have a high level of self-efficacy.

Self-efficacy, the central component of Bandura's social cognitive theory (1997), refers to a form of self-confidence that is situation-specific. Self-efficacy refers to a person's belief in their ability to "organize and execute the courses of action required to produce given attainments" (p. 3). According to Bandura, one way that self-efficacy can be improved is through mastery experiences. For example, a PE teacher that has a positive experience interacting with a student with a disability is more likely to have a higher level of self-efficacy the next time that teacher interacts with a student with a disability. The opposite is also true. A teacher that has a negative experience interacting with a student with a disability is likely to have a decreased level of self-efficacy the next time they interact with a student with a disability (See Block, Taliaferro, Harris, & Krause, 2010 for more information on the application of self-efficacy theory to PE). For this reason, it is crucial that PE teachers have positive experiences interacting with students with disabilities during their teacher preparation programs.

Self-efficacy factors. Research has shown that prior experience interacting and working with individuals with disabilities impacts a PE teacher's level of self-efficacy (Beamer & Yun, 2014; Block et al., 2016; Hersman & Hodge, 2010; Hodge et al., 2004; Hutzler et al., 2005; Smith & Green, 2004; Tripp & Rizzo, 2006). For example, Hersman and Hodge (2010) interviewed five high school PE teachers in Ohio and found that the PE teacher's level of self-efficacy was contingent upon their experiences, knowledge, and formal training, and that their perceived effectiveness increased as they gained experience. Similarly, Hodge et al. (2004) interviewed nine secondary PE teachers and found that the teachers' self-efficacy, particularly toward those with severe disabilities, was impacted by inadequate preparation during their PETE program. While both of these

studies identified teacher preparation as an important component of teacher self-efficacy, the limited sample size made it difficult to generalize the results to all PE teachers. Clearly, more research including larger, national survey research is warranted to learn more about PE teacher self-efficacy.

Improving self-efficacy in PE teachers. Research regarding the self-efficacy of PE teachers is fairly limited. However, a few studies have reported increases in self-efficacy levels as a result of teacher preparation and experience with individuals with disabilities. In one study, Hutzler et al. (2005), found significantly higher levels of self-efficacy among those students attending an APE course compared to students that had not taken the APE course. Similarly, Taliaferrro, Hammond, and Wyant (2015) studied a large number of PETE students enrolled in an APE course that involved a practicum experience working with individuals with disabilities and found that coursework and practicum experience had a significant impact on teacher self-efficacy. In a study that found similarly positive results, Hodge et al. (2002) studied PETE students enrolled in an introductory APE course that included a practicum component working with students with disabilities and found that the PE teachers' perceived competence toward including students with disabilities changed significantly from the beginning of the course to the end of the course.

While these authors found positive effects on self-efficacy through the use of an APE course, Taliaferro and Harris (2014) found that even a one-day workshop was enough to significantly increase self-efficacy scores among PE teachers including students with autism in PE. However, more research is needed to determine the amount of training needed to ensure PE teachers have sufficient levels of self-efficacy.

Positive attitudes. It is important that PE teachers have a positive attitude toward including students with disabilities in PE. In one of the only research studies measuring PE teacher behaviors on including students with disabilities in PE, Elliott (2008) surveyed and observed 20 PE teachers and found that those teachers with more positive attitudes toward including students with disabilities provided significantly more practice attempts for students with disabilities during a PE class than those teachers reporting more negative attitudes toward including students with disabilities. While most PE teachers appear to have positive attitudes regarding including students with disabilities in PE, there are still many PE teachers that do not. Hodge and Jansma (1999) studied 474 students from 22 universities to determine if attitudes toward inclusion could change based on a 15-week course in APE that included a practicum component. They found that the 15-week course in APE with a practicum component significantly impacted attitudes toward inclusion. Similarly, Rizzo and Vispoel (1992) found that attitudes of PETE students became more positive toward inclusion after participating in an APE course. However, both DiNardo et al. (2014) and Folsom-Meek et al. (1999) did not find improved attitudes toward inclusion from students at the conclusion of one course in APE. More research should be done to determine how much education is needed to improve attitudes toward inclusion.

Recommendations for PETE Programs

Properly providing PE teachers with the necessary skills and knowledge within teacher preparation programs is vital for the successful inclusion of students with disabilities in the general PE class. Many researchers have proposed solutions to this problem including requiring undergraduate PETE programs to require more than one

APE course (Block et al., 2016; Hardin, 2005; Hodge et al., 2002; Jeong, 2013; Özer et al., 2013; Taliaferro et al., 2015; Tripp & Rizzo, 2006), infusing concepts of inclusion into the other academic preparation courses beyond the introductory APE course (DePauw & Goc Karp, 1994a; 1994b; Kowalski, 1995; Rizzo, Broadhead, & Kowalski, 1997; Folsom-Meek et al., 1999; Kwon, 2018; Smith & Green, 2004; Taliaferro et al., 2017), introducing concepts of APE and providing experiences with individuals with disabilities as early in the teacher preparation as possible (Collier & Hebert, 2004; Elliott, 2008; Piletic & Davis, 2010), providing PETE students with hands-on practicum experiences (Coates, 2012; Folsom-Meek et al., 1999; Hardin, 2005; Hersman & Hodge, 2010; Ko & Boswell, 2013; Morley et al., 2005; Sato et al., 2015; Vickerman & Coates, 2009), and providing professional development to PE teachers once they are teaching in the schools (Ko & Boswell, 2013; Lieberman et al., 2002; Meegan & MacPhail, 2006; Morley et al., 2005; Park, Koh, & Block, 2014).

Additional APE classes. The need for additional training on including students with disabilities in the general PE class during teacher preparation has been well documented. In fact, researchers, for years, have been calling for additional training on including students with disabilities in PE to be included in undergraduate training programs not only in the U.S., (Block et al., 2016; Hardin, 2005; Hodge et al., 2002; Jeong, 2013; Taliaferro et al., 2015; Tripp & Rizzo, 2006), but also throughout the world (DiNardo et al., 2014; Özer et al., 2013). In a study by Tripp and Rizzo (2006), 68 PE teachers on the East Coast were surveyed regarding including students with disabilities in the general PE class. Data indicated that teachers with more APE coursework had higher perceived competence teaching students with disabilities in the general PE class than

those teachers without additional APE coursework. Tripp and Rizzo argued that it was naïve to expect one course in APE to suffice, and that teaching students with disabilities should be infused into every academic preparation course. Concurring with the opinions of Tripp and Rizzo, Folsom-Meek et al. (1999) surveyed APE students from more than 190 institutions and concluded that, "Completion of one adapted physical education class (as generally taught) does not result in highly favorable attitudes toward teaching students with disabilities" (p. 396). Furthermore, Block et al. (2016) contended that "one introductory APE course is not enough to prepare GPE [general physical education] teachers to accommodate the wide variety of children with disabilities who are being included in GPE class" (p. 10). Unfortunately, there is no empirical data showing significant differences in actual competence between PE teachers who had multiple APE coursework compared to those PE teachers who only had one APE course. Additionally, there is no guarantee that PETE programs can: (a) find room in their curriculum to add more APE courses, and (b) have APE faculty who can teach other APE courses.

Infusion. Increasing the number of required APE courses in PETE programs may not be a feasible solution for some PETE programs. However, infusing APE content throughout the other academic courses in the program may be a more reasonable solution. Researchers have called for infusion of APE concepts throughout the PETE program for more than 20 years (DePauw & Goc Karp, 1994a; 1994b; Kowalski, 1995; Rizzo et al., 1997; Folsom-Meek et al., 1999; Smith & Green, 2004), and it appeared that those calls for infusion have been heeded by some PETE programs. In a study of 75 PETE faculty teaching the introductory APE course, 74% reported infusing concepts of disabilities throughout other courses (Kwon, 2018). In another study that examined how PETE

programs were infusing APE concepts in their teacher preparation programs, Taliaferro et al. (2017) reported that 91% of the PETE programs surveyed (*n*=156) infused APE concepts into courses beyond the introductory APE course. One has to question these findings. The studies reported infusion was being conducted throughout the PETE program, but the surveys did not ask how APE concepts were being infused, who was in charge of infusion, or the quality of infusion. For example, did each professor systematically infuse concepts of disabilities in their courses, or did the professor in charge of the APE course come into other courses to infuse concepts? More detailed research is needed to truly understand the quality and quantity of infusion in PETE programs.

Perhaps the most comprehensive solution for infusing APE concepts throughout the teacher preparation comes from the transtheoretical model proposed by Jin, Yun, and Wegis (2013). In their model, the teacher preparation curriculum was divided into three stages. The first stage involved a lecture-focused course where students were taught the basic knowledge about a topic. Stage two continued with lecture, but added a teaching experience, where the students had the opportunity to practice some of the concepts they had learned during the lectures. Stage three was an internship-focused course where students were fully immersed in the planning, teaching and reflecting processes. Infusing APE concepts beyond what is taught in the introductory APE course could be done using a lecture style in all or some of the other academic courses of the PETE program (stage one). This would be followed by a more thorough analysis of more complex APE concepts combined with hands-on, practical experience working with individuals with disabilities in a PE setting (stage two). Finally, PETE students would have the

opportunity to teach PE to individuals with disabilities, receive feedback from a knowledgeable instructor, and reflect on the teaching experience (stage three). While it may be true that some APE faculty included all three stages of the transtheoretical model within the introductory APE course, research has clearly shown that one APE course was insufficient. Therefore, infusing APE content using the transtheoretical model proposed by Jin et al. across the entire PETE program may be a solution worth pursuing. One concern noted by the authors was that the use of the transtheoretical model in PE has not been tested. However, the model has been successfully employed in fields other than PE.

Early exposure. Research has shown that teachers with more positive attitudes toward including students with disabilities were more effective teachers (Elliott, 2008). One way that PE teachers can develop a more positive attitude toward including students with disabilities in PE is to have hands-on experience with individuals with disabilities as early in the PETE program as possible. In a study looking at undergraduate PE teacher preparation, Collier and Hebert (2004) surveyed over 350 PE teachers in the states of Wisconsin, California, Idaho, Oregon, and Washington. While reporting on the results of their study, the authors stated, "It is important to mention the strong suggestions in the qualitative data for providing undergraduate students with hands-on teaching experience as early as possible in their pre-professional training" (para. 25). This call for hands-on experience early in the teacher preparation program was echoed by Piletic and Davis (2010). Upon analyzing the introductory APE course at 129 universities, they found that the course was taught almost exclusively to students in their junior year of college (80%). Piletic and Davis recommended that the APE course should be offered earlier in the PETE program to allow students more opportunities for contact with individuals with

disabilities. Clearly, introducing APE concepts and providing contact with individuals with disabilities earlier in the PETE programs are solutions worth considering.

Hands-on practicum. Among both preservice and inservice PE teachers, one of the most frequently expressed desires during the teacher preparation was for more hands-on, practical experience working with individuals with disabilities (Coates, 2012; Folsom-Meek et al., 1999; Hardin, 2005; Hersman & Hodge, 2010; Ko & Boswell, 2013; Morley et al., 2005; Sato et al., 2015; Vickerman & Coates, 2009). The desire for more hands-on experience was expressed in both qualitative and quantitative studies, as well as studies conducted in the U.S. and England. For example, Folsom-Meek et al. (1999) surveyed nearly 3,000 APE students and found that those with hands-on practicum experience had more favorable attitudes toward including students with disabilities than those who did not. Additionally, in an explanatory case study with five PE teachers in Ohio conducted by Hersman and Hodge (2010), the PE teachers reported that more professional preparation was needed in the form of hands-on experience. Likewise, Hardin (2005) interviewed five beginning PE teachers who agreed that PETE students needed more opportunities for hands-on experiences working with individuals with disabilities during their PETE programs. Lastly, Coates (2012) surveyed secondary PE student teachers in England and found that more than 60% of the students reported that their inclusion training was ineffective and that more hands-on experience was needed. Because of the preponderance of evidence showing the importance of more hands-on experience with individuals with disabilities, PETE programs should consider ways to provide abundant opportunities for students to work with individuals with disabilities during the PETE program.

Professional development. Adding more APE classes into the PETE curriculum, infusing APE concepts throughout the PETE curriculum, providing interactive experiences with individuals with disabilities early in the PETE curriculum, and providing hands-on practicum experiences with individuals with disabilities during the PETE curriculum are possible solutions for assisting future PE teachers with including students with disabilities in PE. But what can be done for those teachers currently teaching PE in the schools that may not have been properly trained during their teacher preparation? Results from personal interviews with seven PE teachers led Ko and Boswell (2013) to report that, "The need for continued learning opportunities in adapted physical education was reported by all participating teachers" (p. 234). Based on the continued evidence from researchers, PE teachers did not feel adequately prepared to include students with disabilities in PE. It appears the comments from Ko and Boswell are not confined to just the seven PE teachers in their study. The need for professional development for PE teachers has also been suggested by Lieberman et al. (2002), Meegan and MacPhail (2006), Morley et al. (2005), and Park et al. (2014). Taliaferro & Harris (2014) conducted a one-day workshop on including students with autism into the general PE class and found an increase in self-efficacy scores from before the workshop to after the workshop. Similarly, Haegele, Hodge, Filho, and de Rezende (2018) conducted a two-day workshop with PE teachers in Brazil. Using a pretest-posttest group design, they failed to find a statistical significance between pre and post attitude scores, but the Brazilian PE teachers emphasized both before and after the two-day workshop that more professional development opportunities were needed in order for them to feel more confident including students with disabilities in PE. One or two-day workshops, while

not providing statistically significant results, appear to be one way of providing continued professional development for inservice PE teachers. Another area for professional development that has not thoroughly been studied is the use of online education as a means for training PE teachers (Block et al., 2016). More research needs to be conducted on the use of online education for providing professional development for PE teachers to see if it is a viable solution.

There is a continued need to do more to prepare PE teachers to work with individuals with disabilities in PE. Requiring more than one APE course during the PETE program may be one possible solution. For some PETE programs that may not be possible, but infusing concepts of APE throughout the other academic courses may be another potential solution. Additionally, PETE students should have opportunities to interact with individuals with disabilities early and often during their teacher preparation, including hands-on practicum experiences that have the potential to positively impact teacher attitudes toward including students with disabilities in PE. Once these PETE students graduate from college and become PE teachers, it is important that they participate in professional development opportunities that will continue to provide them with opportunities to learn about and include students with disabilities in PE.

Summary of PE Teacher Training, Attitudes and Self-efficacy

This systematic review of literature looked at the current undergraduate preparation of PE teachers for including students with disabilities in PE, attitudes and beliefs of PE teachers toward inclusion, and the self-efficacy of PE teachers when including students with disabilities in the general PE class. Research showed that PE teachers did not feel that current teacher preparation programs adequately prepared them

to include students with disabilities in PE, most PE teachers had positive attitudes toward inclusion, students with more severe disabilities were more challenging to include than students with less severe disabilities, certain disability types were more difficult for PE teachers than others, those PE teachers with previous experience with individuals with disabilities had more positive attitudes toward including them in PE than those without previous experience, and teacher self-efficacy could be improved through coursework and experience.

Most of the research done in the areas of teacher preparation and attitudes do not involve rigorous research design methods. In fact, of the 42 articles highlighted in Table 1, 30 used a survey design. More research needs to be done that uses experimental designs and random sampling. Additionally, an increase in the size of the sample would help with the generalizability of results. Lastly, more research is needed in determining how to increase the self-efficacy of PE teachers toward including students with disabilities in PE.

Online Education for Adult Learners

Prior research has shown that PE teachers do not feel comfortable including students with disabilities in PE, PE teachers generally have positive attitudes toward including students with disabilities in PE, and levels of teacher self-efficacy increase with additional training and experience. One way to provide additional training to inservice PE teachers is through the use of online education. This section of the literature review examines the use of online education for adult learners. First, an examination of how adults learn differently than children was presented, followed by an examination of the

theories that guide the development of online education for adults. Finally, the use of online education for teachers was examined.

Adult Learning Theory

Stemming from the Greek word *paid,* meaning "child," and *agogus,* meaning "leader of," pedagogy is essentially the art and science of teaching children (Knowles, Holton, & Swanson, 2015). The history of pedagogy dates back hundreds of years and has remained an integral part of the K-12 education system ever since. The pedagogical model revolves around the teacher being responsible for the learning of students. In this teacher-centered module, the teacher decides what will be learned, how it will be learned, and when it will be learned. It is based on the assumptions that the learner only needs to know what the teacher is teaching; the learner is dependent upon the teacher; the learner's experiences matter very little while the experiences of the person transmitting the knowledge (usually the teacher) is crucial; learners become ready to learn when the teacher tells them to; learning is the process of acquiring content; and external motivators drive learners (Knowles, et al., 2015). Historically, learning was delivered in this format regardless of whether or not the learner was a child or an adult. However, over the past century a number of scholars have put forth the idea that adults learn differently than children and may therefore require a different way of teaching. This increased attention to the way adults learn has led to a number of theories being proposed regarding adult learning. Although no single theory has developed that accurately and definitively describes how adults learn (Merriam, Caffarella, & Baumgartner, 2007), possibly the most well-known adult learning theory is the theory of andragogy as described by Malcolm Knowles in the late 1960s (Knowles, 1968). Similar to the word pedagogy,

andragogy is a Greek word that refers to the art and science of teaching. However, andragogy differs from pedagogy in that andragogy is the art and science of teaching adults rather than children (Knowles, 1980). Before going into a deeper understanding of the andragogy theory of adult learning, it may be best to take a step back and define what constitutes an "adult." It is important to consider at what point the art and science of teaching children (pedagogy) becomes the art and science of teaching adults (andragogy). According to Knowles et al., (2015) there are four different ways to define an adult. The first definition is a biological one. The biological definition of the word adult states that we become adults at the age in which we can reproduce, which means in early adolescence. The second definition of adult is one of legality. The legal definition of the word adult says that we become adults when we reach the legal age for voting, getting married, obtaining a driver's license, or something similar. The social definition of adult is the third way we are defined as adults. This definition says that we become adults when we begin performing adult roles such as voting, becoming a spouse or parent, working full-time, or something similar. The last definition is a psychological one. We become adults when we are responsible for our own lives and our own learning. According to Knowles et al. this last definition is the most crucial one when it comes to learning. The transition from childhood to adulthood does not happen at a certain age, nor does it happen at the same time for everybody. Rather, we become adults as we mature physically and mentally, begin to assume adult responsibilities, and take responsibility for our own decisions. This transition into adulthood may come earlier for some than for others, but most people do not fully become an adult until they leave

school, are employed full-time, are married, begin to have children, and take responsibility for themselves.

Knowles (1970) initially identified four assumptions that differentiate adult learners from child learners, but as his theory evolved, two more assumptions have been added (Knowles, 1984; 1989). The first assumption about child learning was that children learned what the teacher taught them. According to adult learning theory, adults need to know why they are learning something before they will decide to learn it. The second assumption about adult learners was that adults liked to be responsible for their own lives and their own decisions. Instead of a teacher telling students what they are going to learn, adult learners want to have some control over what they are going to learn and when they are going to learn it. Knowles' third assumption was that the personal experiences of the adults themselves, and not the teacher, are a significant resource for learning. Child learners relied on the experiences of other people, mostly the teacher, to shape their learning, but adults have so much more life experience to draw from that they are not reliant on the experiences of the teacher. The fourth assumption stated that adults were interested in learning what was relevant to their lives and what was important in that moment, not just learning what the teacher was ready to teach them. The fifth assumption about adult learners was that learning needed to be problem-centered rather than content-centered. Children learn the material placed before them, whereas adults what to learn what will help them solve problems or accomplish a particular task. Information must be presented to adults in the context of how it applies to real-life scenarios. The sixth and final assumption regarding adult learners was the role of motivation in learning. Adults' motivation to learn came internally more than externally.

Adults were motivated by self-esteem and job satisfaction more than promotions or higher salaries. For children, however, the motivation to learn came primarily from external sources rather than internal sources.

The adult learning theory of andragogy is not without its critics. One argument among critics is that not all adults follow the six aforementioned assumptions. Knowles (1984) acknowledged this when he wrote that, "The andragogical model is a system of elements that can be adopted or adapted in whole or in part. It is not an ideology that must be applied totally and without modification. In fact, an essential feature of andragogy is flexibility" (p. 418). This concept of flexibility allows the assumptions to be molded on an individualized level depending on the characteristics of each adult learner. The most critical argument against andragogy as an adult learning theory is that, by definition, andragogy is not a theory. Knowles himself admits this, calling andragogy a "model of assumptions" (Knowles, 1980, p. 43) and a "system of concepts" (Knowles, 1984, p. 8), before eventually using the term, "emergent theory" (Knowles, 1989, p. 112) to describe how andragogy describes the adult learning process. Because andragogy is not a theory, the empirical research on andragogy as an adult learning theory is difficult to conduct because there is not a psychometrically valid instrument for measuring andragogical constructs (Knowles et al., 2015). Although calls for a valid instrument have been issued as far back as the mid-1980s (Conti, 1985), one has yet to be created. Because a psychometrically valid instrument for measuring andragogy does not exist, strong empirical research to support it will always be lacking. Typical of the types of studies one can conduct using andragogy as a model for adult learning, Callary, Rathwell, and Young (2017) looked at the use of andragogy with swim coaches and advanced

swimmers and discovered that coaches made better connections with their athletes when they used andragogy principles than when they did not use andragogy principles. It must be noted that this study was not conducted using rigorous research methods. Nevertheless, results from this study appear to support the belief that principles of andragogy may work for adult learners in many fields of study.

This type of study offers evidence that the principles of andragogy as an adult learning theory have merit while also demonstrating the lack of strong empirical research required for it to be considered a theory. Due to this void of strong empirical research a number of other adult learning theories have evolved that are more prescriptive, including McCluskey's theory of margin, Illeris' three dimensions of learning model, and Jarvis' learning process (Merriam et al., 2007). However, none of these theories has received as much attention in the literature as Knowles' andragogy theory. Even though the lack of a valid measurement instrument made conducting research on andragogy as a model for adult learning difficult, significant research has been done regarding the generalizations that resulted from Knowles' six assumptions about the adult learner. These generalizations include: most adults are self-directed and independent learners (self-concept); adults bring a wealth of personal, educational, and professional experience from their lives and these experiences should be a resource to help them make connections to the learning; adults want the learning to be relevant and practical to their personal lives (learning orientation); and adults frequently have high motivation levels when participating in continued learning or education.

Self-concept. Adult learners feel the need to be responsible for their own learning. One way to accomplish this is for learning to be self-paced. That is, the learner

decides when to access the information, how fast to proceed, and when to stop learning. In the field of instructional design, the research on self-paced learning is significant (Morrison, Ross, Kalman, & Kemp, 2013). There are many benefits to creating learning for adults that is self-paced. According to Morrison et al. learners participating in self-paced learning tend to work harder, learn more, and retain more of what they learn. Self-paced learning is beneficial because learners, both slow and advanced, can proceed at a pace that is commensurate with their abilities to learn. However, there are some limitations to the use of self-paced learning. For those learners lacking self-discipline, self-paced learning may result in a delay of completing the required learning. Also, because the learning is self-paced, access to an instructor, or someone that can provide guidance, clarify issues of confusion, and answer questions is usually limited. Nevertheless, research on self-paced learning, especially in the field of online education, has shown positive results for adult learners. In one recent study, Rillero and Camposeco (2017) created an online training module for preservice and inservice teachers on the use of problem-based learning that was guided by Knowles' andragogy theory. The authors reported that the self-pacing component and the application component of the online training module may have contributed to the participants high success levels. Similarly, Rizzuto (2017) used a self-paced online professional development course with 15 university faculty members to identify recommendations for those creating self-paced online training. Using a mixed-methods triangulation case study design to evaluate the online training module, the participants in this study liked the course and stated that they would be willing to participate in other self-paced online training modules. Furthermore, the participants found the delivery method to be both appealing and useful. The

participants commented that the self-pacing of the training module was helpful as it allowed them to work on it at a time that was convenient for them. Rizzuto concluded, "faculty who completed the course were satisfied with the outcomes and learned from the self-paced online learning experience" (p. 85). It is apparent from the literature that self-paced learning is one benefit to online education for adults.

Experience. Instructional strategies that revolve around the experiences of the learners are very useful in online education. Some of these instructional strategies, like case studies, group discussions, and simulation exercises, tap into the vast experiences of the adult learners (Morrison et al., 2013). Case studies, for example, are situations that provide detailed information about a real-life scenario (Morrison et al., 2013). Learners must analyze the situation and decide on an appropriate course of action, or discuss the course of action undertaken in the case study. Drawing on their past experiences, learners then explain or defend their analysis of the situation. Case studies help learners, "interpret, reflect on, and apply experiences—their own or those of someone else—in such a way that valuable learning takes place" (Kolodner, Owensby, & Guzdial, 2004, p. 829). Elliott (2010) examined how a narrative case study in an online asynchronous religion course changed learners' appreciation, understanding, and respect for the beliefs of other people. He found that the case study helped learners change their beliefs, attitudes, and way of thinking. The use of case studies for physical education teachers has been highlighted by Boyce, King and Harris (1993) with non-empirical results showing an increase in student participation and the ability to translate decision-making skills into real-world scenarios. Beyond the specific instructional strategy of case studies,

the ability to socially interact with other students and share life experiences has proven valuable for many learners.

Learning orientation. The use of case studies for adult learners can also aid in fulfilling Knowles' assumption that adult learners want learning to be relevant and practical to their personal lives. Under the learning orientation assumption adult learners are motivated to learn when the information presented will help them with problems that they face in their daily lives, and when opportunities to learn are presented in real-life scenarios. One way to accomplish this is through the use of active learning. According to Morrison et al., (2013) "learning is enhanced when learners are actively involved" (p. 204). Grabinger and Dunlap (1995) described the use of rich environments for active learning (REAL) as "learning that takes place within an authentic context" (p. 670). Providing learning in an authentic context is important because it holds more relevance to the learner by relating to experiences and issues they are dealing with every day. Additionally, the use of active learning helps learners develop a deeper knowledge of the information in a way that will transfer to other learning contexts. Finally, the use of active learning requires cooperation and teamwork amongst learners. According to Bonwell and Eison (1991), the characteristics that define active learning include students being involved in more than listening; the emphasis is not on transmitting information to the student, but rather developing the students' skills; students are required to perform higher order skills such as analysis, evaluation and synthesis; and students are engaged in activities (e.g., reading as opposed to listening). In a study looking to increase active learning in students, Cook and Babon (2017) found that using online quizzes as an instructional strategy to increase active learning among college students was an effective

instructional strategy. Similarly, Armbruster, Patel, Johnson, and Weiss (2009) reformatted a lecture-based Biology course to include active learning during every class lecture and found that student satisfaction and performance increased significantly with the addition of daily active learning opportunities.

Another form of active learning is problem-based learning (PBL). PBL is a popular type of active learning where learners use real-world problems to test problem-solving skills (Albanese & Mitchell, 1993). The benefits of PBL are beyond the scope of this article, but one study highlighting the use of PBLs as a method of active learning in online education was done by Rounds and Rappaport (2008). They used PBLs in online education with nursing students and concluded that PBLs, when used in an online course, helped students become independent, self-motivated learners.

Motivation. Drawing on the experiences of the learners and using active learning strategies are great motivators for adult learners. However, for adult learners to truly be motivated to learn they must understand why they need to learn something. The most well-designed online training module is of no use if adults do not feel the need to learn. With that in mind it is essential that online education for adults be created around areas and topics of interest, or need, for adults. The use of online education as a form of professional development for busy, overworked inservice teachers, who, for example, may not have the time or resources to attend classes at a local university is one way that online education can be used to fill an expressed need.

The idea that adults learn differently than children and thus should be taught differently is widely accepted. This applies to adults across all professions and ages. While not the only theory on how adults learn, nor without its critics as a theory,

andragogy points to a few clear principles that should be followed when teaching adult learners. Andragogy can be used as a guiding theory in the creation of learning for an adult population. However, other theories must be included when discussing the type of learning in which the adult learner will participate.

Multimedia Learning

As noted above, Knowles' adult learning theory describes the differences between how children learn and how adults learn. Knowles' theory does not differentiate between learning in a traditional, face-to-face setting versus learning in an online setting. However, other researchers have discovered that the manner in which information is presented in the online setting does make a difference. One researcher that has done extensive work in the field of online education is Richard Mayer. Mayer's cognitive theory of multimedia learning (Mayer, 2009) described how people learn from pictures and words. Mayer's theory of multimedia instruction was based on three assumptions. The first assumption was that people possessed separate channels for processing auditory and visual stimuli. The second assumption was that there was a limited amount of information that can be processed by each channel at one time. The final assumption guiding the cognitive theory of multimedia learning was that "humans engage in active learning by attending to relevant incoming information, organizing selected information into coherent mental representations, and integrating mental representations with other knowledge" (p. 63). Based on these three assumptions, Mayer suggests that when creating multimedia instruction: (1) the material should have a coherent structure, and (2) the message should provide guidance to the learner on how to build structure. Before

delving too deeply into Mayer's multimedia theory it may be prudent to first briefly examine the cognitive load theory upon which it is based.

Learning science tells us that the learning is a process that changes one's disposition and abilities that can be observed by a change in one's behavior (Gagne, 1985). Learning consists of three processes (Morrison et al., 2013). The first process involves attending to or being aware of information coming to our senses. Second, the information is processed or transformed so it can be placed in our memory. It has long been believed that learners can only remember between five and nine items at one time (see Miller, 1956), so the third process tells us that information in our short-term memory must be transferred to long term memory or it will be quickly forgotten (Morrison et al., 2013). Cognitive load theory tells us there are two types of loads (i.e., intrinsic and extraneous), and that if our brain receives too much of either load, we will not be able to process all of the information.

The driving force behind Mayer's multimedia theory is that "people learn better from words and pictures than from words alone" (p. 11). Multimedia instruction is defined as a presentation of information using both words and pictures in order to promote learning. Applying cognitive load theory to multimedia instruction, Mayer determined that there are three kinds of cognitive load; extraneous, essential, and generative. Extraneous cognitive load refers to the processing of extraneous (i.e., not relevant) information that demands so much processing attention that there is not enough capacity to process the important information. Essential cognitive processing refers to what is required to keep the essential information in working memory. This will depend on the complexity of the information being processed. If learners spend most of their

time performing essential cognitive processing they will retain the information well, but it will not transfer to their performance. The third and final cognitive load is generative cognitive processing. This is the processing required in order to gain a deeper understanding of the information, and many times is controlled by the motivation level of the learner. Good multimedia design looks to reduce extraneous cognitive load by reducing the information or content that is not relevant for learning, manage essential cognitive load by using techniques that assist the learner in processing the information, and foster generative cognitive load by designing multimedia learning that will be motivating to the learner. To help control the cognitive load demanded by multimedia learning, and in accordance with the three assumptions previously listed, Mayer created 12 instructional design techniques for the creation of multimedia instruction. The first five techniques help to reduce the extraneous cognitive processing, the following three techniques are aimed at managing essential processing, and the final four techniques help to foster generative processing. These 12 principles are coherence; signaling; redundancy; spatial contiguity; temporal contiguity; segmenting; pre-training; modality; multimedia; personalization; voice; and image, and will be described in more detail below. Each of these principles comes from Mayer's previous studies on the topic of multimedia learning and are cited in his book, *Multimedia Learning* (2009).

Extraneous cognitive processing.

Coherence principle. The coherence principle states that people learn better when extraneous (i.e., not relevant) information is not included. Learning can be improved when; (1) interesting but irrelevant pictures and words are not included in the multimedia learning material, (2) interesting but irrelevant sounds and music are not

included in the multimedia learning material, and (3) unnecessary words and symbols are not included in the multimedia learning material. Because the extraneous material is not necessary for learning, it can redirect attention away from the material that is necessary for learning. Mayer tested the coherence principle and reported that learners performed better on tests 13 out of 14 times when the multimedia presentation material did not contain extraneous material.

Signaling principle. The second technique to reduce extraneous material is the signaling principle. This principle involves adding cues to highlight the organization of the material. Signaling is helpful because it guides the learner to the important features of the material which helps to reduce the cognitive load. The signaling principle was also tested by Mayer, who found that in five out of six tests learners performed better on the tests that used signaled multimedia compared to those tests that used nonsignaled multimedia.

Redundancy principle. The redundancy principle states that "people learn better from graphics and narration than from graphics, narration, and printed text" (p. 118). Because the information is presented visually in two ways (i.e., graphics and printed text), the brain is not able to interpret both at the same time, and therefore, must shift back and forth between the graphics and the printed text. Also, the incoming narration provided along with the printed text requires learners to expend significant mental energy comparing the two forms of stimuli. Similar to the signaling principle, learners receiving just graphics and narration performed better on five out of six tests than did those learners receiving graphics, narration, and printed text.

Spatial contiguity principle. When words and pictures that are correlated are placed closer together learners use less cognitive resources searching and thus have more ability to remember the information. That is the idea behind the spatial contiguity principle. The test results from these studies was even more conclusive as all five tests showed higher scores when the information was placed close together rather than separated.

Temporal contiguity principle. Similar to the spatial contiguity principle previously mentioned, temporal contiguity relates to corresponding words and pictures being placed close together to reduce cognitive load. Unlike spatial contiguity, however, temporal contiguity refers to corresponding words and pictures being presented at the same time as opposed to being presented one after the other. It is easier for the learner if the words and pictures are placed on the same screen as opposed to the words being presented on one screen and the picture being presented on the following screen. Mayer's experimental tests supported this notion. In all eight tests learners presented with words and pictures simultaneously outscored learners that were presented with words and pictures successively.

Multimedia learning that reduces the amount of nonrelevant, extraneous material, that uses signaling to highlight key elements, that refrains from using redundancy in graphics, narration and printed text, that places related words and pictures close to each other and simultaneously, will help to reduce the cognitive demand placed on learners and make it easier for them to learn the material. Once the irrelevant information has been removed from the material, it becomes important for multimedia designers to follow correct principles for managing essential information.

Essential cognitive processing.

Segmenting principle. The segmenting principle suggests that multimedia learning should be broken up into segments that are user-paced rather than presenting all of the material as one continuous segment. Being in control of the pace of the learning is also a vital component of Knowles's theory of adult learning discussed previously.

Pre-training principle. Similar to the signaling principle mentioned previously, the pre-training principle recommends highlighting key components of the learning material before the learner actually begins the learning process. Unlike the signaling principle that recommends highlighting important components of the organization of the learning, the pre-training principle recommends highlighting names and characteristics of main concepts. Highlighting main concepts beforehand allows the learner to make mental connections before the main lesson, thus easing the cognitive load once the main lesson begins.

Modality principle. One of the three main assumptions of the cognitive load theory upon which Mayer's multimedia learning theory is based, is the idea that there is one channel for receiving information visually, and one channel for receiving information auditorily. The modality principle follows this assumption by stating that learners do better when information is presented through pictures and spoken words as opposed to pictures and written words. The logic is that pictures and written text both use the same visual channel to receive information, thus overloading the visual processing channel. Providing pictures (visual) and spoken words (auditory) allows the learner to use the visual channel to process the pictures and the auditory channel to process the spoken words. Mayer's extensive research has shown that on 17 tests of problem-solving, those

learners who received the information in pictures and spoken words outperformed those learners who received the information in pictures and written words.

Similar in concept to the modality principle is the idea that information presented through video is preferable to information presented through text. In a study of 26 inservice teachers participating in a university online graduate course, Fidalgo and Thormann (2017) found that most students reported that they preferred the content presented in a video format as opposed to a text format (i.e., Powerpoint). At odds with these results was a study conducted by Turner, Fuchs, and Todman (2015), which looked at static vs dynamic tutorials. The authors found that learners benefited more from static text-and-image tutorials than from dynamic audio/visual tutorials. While these two studies appear to have contradictory results, it may be possible that learners reported preferring videos to text but data showed that performance was improved when the information was presented in text. More research may be needed to determine if there is a difference in learning when the information is presented in a video format compared to a text format.

Presenting multimedia learning in user-paced segments, highlighting key names and characteristics before presenting them in the main lesson, and using pictures and spoken words instead of pictures and written words to present information will help learners manage essential cognitive processing which will make it easier for them to learn the material.

Generative cognitive processing.

Multimedia principle. To make the most use of our cognitive processing ability, the multimedia principle states that learning from words and pictures is better than

learning from words alone. The combination of the dual-processing channels allows learners to receive both visual and auditory stimuli and make connections between the two. Research is clear that learners receiving both words and pictures perform better than learners receiving just words.

Personalization principle. People learn better when the words used in multimedia learning are in a conversational style as opposed to a formal style. The rationale behind this principle is that when learners feel the information is presented directly to them, they are more likely to try harder to understand the information. Mayer's research has proven this to be true as well.

Voice principle. The voice principle posits that people learn better when the voice speaking to them is a human voice rather than a computer voice. The preliminary research behind the voice principle suggests that there is truth to the theory that learners perform better when the voice is a human voice and not a computer voice, but additional research must be done to firmly establish the voice principle as a core tenet of multimedia learning.

Image principle. While all of the previous multimedia principles stated what to do in order to help people learn, the image principle, while still in the early stages of development, indicates what not to do. The image principle indicates that using the speaker's image on the screen does not meaningfully help learners understand the material. One concern with using the speaker's image is that it adds extraneous, nonrelevant stimuli that provides no additional knowledge, thus taking it out of line with the first assumption regarding reducing extraneous stimuli.

When creating multimedia learning that will maximize the learner's ability to process the information, the material presented should be in the form of words and pictures rather than just words alone, use a conversational tone instead of a formal tone, use a human voice and not a computer voice, and should refrain from including the image of the speaker.

Supporting research. The use of Mayer's multimedia theory is well represented in the literature. A cursory web search through an online education database for English language journal articles published in the last 10 years using the search terms, "Mayer" and "multimedia learning" resulted in nearly 3,000 peer-reviewed journal articles. Many of the articles examined the effects of a specific principle of the theory as it related to learning. For example, Downs, Boyson, Alley, and Bloom (2011) looked at the use of the multimedia principle in teaching research methods using MP3 players to undergraduate students. Consistent with Mayer's theory, these authors found that the participants that received the information through multiple modes performed better than those that received the information through only one mode. The authors concluded that, "learning improved when the research methods lesson appealed to two sensory channels as opposed to just one" (p. 195). Similarly, Hagiwara (2015) studied 32 Japanese language learners using Mayer's multimedia theory and found results to support the claim that "learners are better able to attend to input and integrate it in a condition in which they receive input through both visual and auditory paths" (p. 468). Caution must be taken when attempting to generalize the results of these two studies as both studies employed undergraduate college students as study participants, a control group was not used in either study, and participants came from a convenience sample.

Other researchers have used multiple principles, rather than the entire multimedia learning theory to guide the creation of online education. For example, Dania, Tyrovola, Koutsouba, and Hatziharistos (2012) created a 10-week dance unit for 2nd year Greek undergraduate students using 8 of the 12 principles outlined in Mayer's multimedia theory. Participants in their study increased on-task time and physical activity time as the course progressed. However, the authors cautioned against the use of excessive amounts of cognitive information load which may have slowed down the participants ability to learn and understand the material.

One study that used Mayer's entire theory to guide the creation of multimedia education was that of Kennedy et al., (2016). As a way of using online learning with teachers, Kennedy et al. used Content Application Podcasts (CAP) with general and special education teachers to determine if knowledge could be improved. Results showed that those teachers participating in CAPs demonstrated significantly more improvement on knowledge than those not using CAPs. The authors concluded that, "these principles (i.e., Mayer's) are quite useful in the design and delivery of multimedia-based instruction for teacher candidates" (p. 316). To date, Kennedy and his colleagues have conducted over a dozen studies using online technology to improve teacher knowledge, with each study using Mayer's theory of multimedia learning to guide the creation of the online technology.

While Mayer's theory is widely used, and has been shown to produce positive results, it must be pointed out that one common criticism of Mayer's theory is that the principles the author created to guide multimedia learning are based significantly on the author's own previous studies.

It is clear from the literature that when developing online learning minimizing extraneous load, managing essential load, and fostering generative processing are vital to creating effective multimedia learning. It also appears clear in the literature that the use of Mayer's multimedia learning theory can be applied to online learning in any field, but especially in the field of education.

Online Education for Teachers

The use of online learning in education is not new, but the use of online learning in education has seen a significant increase in the past few years (Means, Bakia, & Murphy, 2014). One reason for the significant growth of online learning in education is due to people living more of their lives online. Technology is ubiquitous, and more and more people are spending time in the digital world. Another reason for the rapid grown in online learning is cost. Online learning has shown to be a cheaper educational option than traditional face-to-face learning. Lastly, the perception exists that learning online provides a better learning experience than traditional learning (Means et al., 2014). Rizzuto (2017) created an online training module for university faculty that was completely self-paced and asynchronous, and which they had a 4-month timeframe to complete. Using a mixed-method case study design the author found that the participants believed the course helped them gain a better understanding of the material. The participants also liked the ability to begin and end when they pleased, and to work on the training module when it was convenient for them. The participants also stated that the online training module format (i.e., self-paced, asynchronous) was appealing and they would recommend the course to other faculty members. In another study Rillero and Camposeco (2017) created an online training module (based on Knowles' andragogy

theory) for use with preservice and inservice teachers. Reporting on the use of the online training module the participants particularly liked how the training was self-paced and the content applicable. Using an asynchronous online training module that they created themselves, Morrison, Fleming, Gray, Fleming, and Hamad (2013) used a pre/post research design to determine if knowledge acquisition improved as a result of the online training module. A total of 30 professional Early Intervention specialists took a cognitive pretest and then had three weeks to complete the online training module and the post test. Post test scores showed a 43% increase in cognitive knowledge over pre-test scores.

Online education in special education. One important area of education that has recently seen an uptick in research is the field of special education. Even with the recent surge of research, the literature base on the use of online education in special education is limited. One study that examined at the use of online education in special education was that of Gillespie-Lynch et al., (2015). They created an online training module to teach college students about autism. The authors used a quasi-experimental pre/post design with 365 college students to determine if participation in an online training module about autism increased participants' knowledge about autism. Results from the study indicated that the online training module increased participants' knowledge about autism. The authors suggested that online training may be an efficient and inexpensive way to increase knowledge about a disability. The large sample size (N=365) in this study was helpful, but all of the participants were college students that volunteered to be in the study, and a control group was not used to compare pre/post scores, so caution must be exercised when analyzing the results.

The use of online training for inservice special education teachers was also part of a study conducted by Rakap, Jones, and Emery (2015). The authors created a web-based professional development program for teachers of children with ASD and found that teachers perceived themselves to be more competent and knowledgeable after having participated in the professional development program. Likewise, the participants in the study had a positive attitude about the use of a web-based format to provide professional development. It must be noted that the professional development these teachers received included multiple online courses during the space of two years and also included a face-to-face component to the training. But the fact remains that the online professional development increased knowledge and inservice teachers had positive attitudes toward the use of online training. Finally, as mentioned previously Kennedy et al., (2016) used Content Application Podcasts (CAP) with general and special education teachers to determine if cognitive knowledge could be improved with the use of online training. Their results showed that those teachers participating in CAPs demonstrated significantly more improvement on knowledge than those teachers not using CAPs.

Online education in physical education. The literature regarding the use of online education in the field of special education is limited. But even more limited is the literature regarding the use on online education in the field of PE. Dating back to the beginning of this century, Bennett and Green (2001) report that "research on student learning through technology within a physical education setting is almost nonexistent" (p.2). In fact, an index search of the relevant literature in the field of online education in PE identified only 5 articles in the previous 17 years, including only 3 in the past 10 years. One of the first studies done on the use of online learning in PE was carried out by

Côté, Chen, and Keppell (2008). Using three asynchronous online learning activities with 54 Chinese students in their 3rd year of PE teacher training the authors found that student-teacher interactions were higher than in a face-to-face class. The authors indicated that another benefit to the asynchronous online activities was the opportunity for the students to interact outside of the classroom. The use of online education in their study was not all positive. The authors reported that the amount of time required by the instructor using an asynchronous teaching style was greater due to the need to provide prompt feedback to students' interactions. While the authors clearly stated that the use of technology will not change a poorly designed course into a stimulating course, they did suggest that technology, as a tool, has the potential to "enhance learning and development of knowledge in physical education" (p.60).

Another study looking at the use of online learning in PE was conducted by Kwon and Block (2017). The authors used an e-learning supplement to provide training to 74 PETE students in Korea on how to teach team sports to students with intellectual disabilities. Using a pre/post experimental design, the researchers found that both self-efficacy and cognitive knowledge scores significantly increased following the use of an e-learning supplement. One concern about the previously mentioned studies was that the participants for both studies were preservice teachers and not inservice teachers.

The use of online education for inservice PE teachers is even more sparse. In fact, only one study was found that looked at online education for inservice PE teachers, and it was a doctoral dissertation. In his dissertation study, Healy (2015) used a randomized experimental design to evaluate a self-created online professional development course for 51 inservice PE teachers on implementing a peer tutoring

program in their PE classes. The results of his study revealed that the online professional development course was very effective at increasing knowledge compared to those teachers in the control group. It is interesting to note that Healy also used Knowles' andragogy theory and Mayer's multimedia theory to guide the creation of the online professional development. In his conclusion, Healy stated that the use of online education has potential as a way to provide inservice PE teachers with additional knowledge about inclusion.

The use of online education with adapted PE teachers yielded two studies. In the first study, Healy et al. (2014) surveyed 106 Certified Adapted Physical Educators (CAPE) throughout the country and identified three major advantages and three disadvantages of using online education for practicing teachers. These CAPEs reported that flexibility was easily the most advantageous benefit of online education while increased learning opportunities (including access to experts) and being part of a community of learners were the other advantages. The CAPEs also reported that the lack of social interaction, limited practical experience, and issues with technology were hindrances to online education. A well-designed online education course should be able to address the arguments about social interaction and issues with technology, but the argument about limited practical experience in online education is a valid argument.

Finally, Sato, Haegele, and Foot (2017) examined the use of an online course in APE with nine inservice APE teachers in Ohio. Using an explanatory case study design, the researchers found that online APE courses helped APE teachers develop lessons and teaching strategies, and teachers had positive learning experiences. However, APE teachers cited a lack of prompt feedback from the instructor as a concern, and therefore,

preferred a hybrid model (face-to-face plus online). Regardless of the concerns about feedback, the results of this study demonstrate that "PE teachers can have positive and meaningful experiences when enrolled in online APE course work" (p. 175). As noted many times earlier, this study should be viewed as preliminary given the small sample size.

There is clearly a need for continued research in the field of online education for inservice teachers, particularly PE teachers. Nevertheless, early results appear to indicate that online education has many benefits for inservice teachers, and the use of online education to provide continued professional development has the potential to increase teacher knowledge.

Summary of Online Education for Adult Learners

Research suggests that a clear separation should occur between the way children and adults are taught. Knowles' theory of adult learning (andragogy) provides guidelines for providing instruction to adult learners and these guidelines are just as relevant to instruction presented online as they are to instruction presented in the traditional face-to-face setting. Mayer's principles for creating effective multimedia guide the creation of online learning. The confluence of the guidelines put forth by Knowles about how adults learn and Mayer's principles for effective online education can guide the creation of effective online education. Effective online education has great potential for inservice teachers, among those are special education and physical education teachers. It is crucial that the research into the effectiveness of online learning keep pace with the incredible growth of online learning to ensure best practices are being used when creating online education for inservice teachers.

Chapter 3

Methods

This study used a pre/post experimental design to measure the effectiveness of an online training module on the knowledge and self-efficacy of PE teachers regarding the inclusion of students with disabilities into team sport activities in the general PE classroom. Participants took a pretest to gauge knowledge of disabilities and modifications in PE before participating in the online training module. Participants also took a pre-intervention survey that measured self-efficacy relating to including students with disabilities in team sport activities in PE. After completing the training module, participants once again took the knowledge test and the self-efficacy survey. Pretest and posttest scores were analyzed and compared using a paired t-test to determine if knowledge scores and self-efficacy scores increased as a result of participating in the online training module. Permission to conduct the study was obtained from the university's Institutional Review Board (see Appendix A).

Research Question

Due to the limited research in the field of online education for PE teachers, this exploratory experimental study aimed to determine if the use of an online training module for inservice PE teachers regarding including students with disabilities in team sport activities in PE improved teacher knowledge and self-efficacy. Specifically, the purposes of the study were: (a) to determine if the online training module significantly improved the content knowledge of inservice physical educators related to including students with disabilities in team sport activities within the general PE setting, and (b) to

determine if the online training module significantly improved the self-efficacy levels of inservice physical educators related to including students with disabilities in team sport activities within the general PE setting before and after taking an online training module.

Research Design

According to Creswell (2009), there are three criteria for selecting a research design; the research problem, the researcher's experience, and the target audience. First, the research problem should drive the design choice. The researcher must decide what the research problem is and what would be the most appropriate way to study that problem. The second criteria used to determine the research design is the personal experience of the researcher. What experience does the researcher have designing research? Has the researcher ever done this type of research before? Do they know how to do this type of research? The third and final criteria used to consider when selecting a research design is knowing who the target audience will be. Are the people that will read the study expecting the information in a certain way? Are the results of the study going to be published? If so, what type of research design is accepted for the journal to which the manuscript will be submitted? It is important to present the information in a way that the target audience can consume it.

Quantitative research design. The oldest and most common method of conducting research is the quantitative method. Quantitative research has been around since the late 1800s, and was the main method of research for most of the 20th century (Creswell, 2008). Quantitative research tests theories by examining the relationship among variables. Quantitative research typically involves statistical analysis and has, as a main goal, the generalization of the results of a small sample size to the larger

population (Creswell, 2008). A quantitative research design is a type of research "in which the researcher decides what to study; asks specific, narrow questions; collects quantifiable data from participants; analyzes these numbers using statistics; and conducts the inquiry in an unbiased, objective manner" (Creswell, 2008, p. 46). The main strategies for inquiry with quantitative research designs are experiments and surveys (Creswell, 2009). When performing experiments, the researcher wants to know if the treatment influences the outcome (Creswell, 2009). This design allows for the researcher to determine whether or not the treatment played a role in the outcome by comparing the results of the treatment group with the results from the control group.

Quantitative design choice. There are several benefits to using a quantitative research design for this study. One benefit is that the quantitative design is the most well established and well-known form of research design (Creswell, 2008). It is familiar with the target audience and it is the research design most familiar to the researcher.

Another benefit to a quantitative design is that data that come from quantitative designs help to answer the research question. It can answer, for example, the probability that a given treatment was effective by comparing the scores of one group of study participants to the scores of another group of participants. For example, Smith, Smith, and Boone (2000), compared students enrolled in two separate education technology integration courses to determine if learning was better in a traditional classroom setting or an online learning environment. By providing the same content to both groups of students the authors were able to determine if students participating in the traditional classroom setting and the students participating in the online learning environment both adequately learned the material. The results of this study provided evidence that learning

in an online environment may be as effective as learning in a traditional classroom setting.

Lastly, data are numerical scores that can be used to compare pretest scores with posttest scores. Quantitative research is the most appropriate research method when data are numbers.

The use of a quantitative research design is not without its limitations. As noted previously, data from a quantitative design may tell us the probability that a treatment was effective, but it does not necessarily tell us why; leaving us to make assumptions based on what data tell us. It is possible that knowledge scores and/or self-efficacy scores increase from pretest to posttest, but data does not explain why the scores improved. It may be assumed that the online training module was the cause of the increase in scores, but that would be an assumption rather than a definitive answer.

A quantitative design also does not provide a significant amount of data. For example, a research study using a pre/post design would only provide pre and post test scores. A qualitative research design, or a mixed-methods design would provide more data that may help to determine why the test scores changed from pre to post.

Rationale for research design choice. The research question for this study aims to determine whether or not the online training module is effective at increasing knowledge and self-efficacy of inservice PE teachers regarding the inclusion of students with disabilities in team sport activities in the general PE setting. This research question is narrowly defined, the dependent variable is known, the data being collected are pre and post numerical scores, and statistical analysis will be used to compare the scores of the

participants. All of these factors point to a quantitative research design being the preferred design.

Experimental design. Experimental research aims to "determine if a specific treatment influences an outcome. This impact is assessed by providing a specific treatment to one group and withholding it from another and then determining how both groups scored on the outcome" (Creswell, 2009, p.12). This study used an experimental design with an experimental group and a waitlist control group to measure the effectiveness of an online training module on the self-efficacy of PE teachers regarding the inclusion of students with disabilities in team sport activities within the general PE classroom. The participants signed up to be in the either the first start group or the second start group. The researcher did not assign the participants to a group and the participants did not know whether they were assigned the control group or the treatment group. The first start group was the experimental group. The participants in the experimental group took the knowledge pretest and the self-efficacy survey. They then had three weeks to complete the online training module. At the conclusion of the training module the participants took the knowledge posttest and the self-efficacy survey. The participants in the second start group were the control group. They took the knowledge pretest and the self-efficacy survey at the same time as the experimental group, and during the three weeks provided for the experimental group they received no additional resources. At the conclusion of the three weeks, the participants in the waitlist control group took the knowledge posttest and the self-efficacy survey. They were then given three weeks to complete the online training module. Three weeks was chosen because it allowed the participants a reasonable amount of time to complete the training module

while also providing a deadline for completion. Similar studies using interventions with inservice PE teachers have used a one-day workshop (Taliaferro & Harris, 2014) and a four-week intervention period (Healy, 2015).

The use of a waitlist control group was used in a study by Healy (2015) that analyzed the use of online training for inservice PE. In his study, all of the participants took the knowledge pretest and those assigned to the experimental group immediately began the training module. After a period of four weeks both the control group (who up to this point had not participated in the study beyond taking the pretest) and the experimental group (who had completed the online training module) took the posttest. After taking the posttest the control group was then allowed to participate in the online training module. Additionally, McNeil, Capage, Bahl, and Blanc (2010) used a waitlist control group to measure the effectiveness of an early intervention for young children with behavior problems. Dependent measures were administered to both groups at the beginning of the study and then once again at the conclusion of the treatment for the experimental group. After participating in the pre and post measurements, the waitlist control group was then able to access the early intervention treatment.

Because the target population may potentially include any practicing PE teacher in the United States, it is not possible to get a truly random sample of participants. Thus, recruitment of participants must be undertaken through non-probabilistic methods such as recruiting through state and national organizations and websites, and using personal connections (snowballing) to find a sufficient number of participants for the study.

Participants

To be eligible to participate in this study research participants were inservice PE teachers currently teaching PE in a secondary school setting in the United States or inservice PE teachers that have recently taught secondary PE and may return to teaching secondary PE in the near future. Because team sport activities are taught beginning in middle school and continuing through high school only secondary PE teachers would be able to immediately use the information provided by the online training module. Participants in this study were at least 21 years old and had graduated from high school. Most, if not all, of the participants had a Bachelor's degree, and many of those degrees were in the field of PE. Teacher age and teaching experience varied considerably. Participants were located anywhere in the United States, although access to the internet to participate in the online training module was required. Participants were recruited using non-probabilistic sampling (Creswell, 2008). Recruitment of participants occurred through the national PE teacher organization (i.e., SHAPE America), through state PE teacher organizations, through a popular PE teacher website (i.e., PECentral.com), through convenience sampling of PE teachers near the research facility, and through the use of snowballing. Participant demographics were broken down into gender, age, teaching experience, prior APE classes, and education level, and analysis was run to determine if any of these factors played a role in teacher self-efficacy (for a list of demographic questions, please see Appendix B). Descriptive statistics for these categories was provided. A power analysis was conducted using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) to determine the appropriate sample size for the study. With power set at .8, alpha at .05 and the effect size between .75 and 1, the appropriate sample size for this study was between 14 and 23 people per group for a total

of 28-46 participants. To account for potential attrition, this study aimed to recruit 50 participants.

Instrument

Knowledge test. One aim of this study was to determine if the online training module was effective at increasing inservice PE teachers' knowledge regarding the inclusion of students with disabilities in team sport activities in the general PE setting. In order to measure an increase in teacher knowledge, a 25-question test was created by the researcher based on the content in the online training module. In addition, three open-ended questions were added to the test to gauge the ability of the learner to translate the information in the module to a novel scenario. In the training module, modifications using the S.T.E.P. model were presented for the sports of basketball and volleyball. During the training module learners had the chance to submit responses on the modifications they would make to the sport of soccer. The three open-ended test questions asked learners how they would modify the game of softball for a student with each of the three disabilities (i.e., ID, PD, VI). In order to evaluate the learner's response, a three-part grading rubric was created to individually score each response (see Appendix C). The rubric was sent to an APE expert to establish content validity before being used to grade responses. Grading of the open-ended questions was conducted independently by two doctoral students in APE. Where disagreements arose the two graders met together and discussed the score until a consensus could be reached. Responses to each question were graded on a scale of 0 (unacceptable) to 3 (exemplary). The total score of the three open-ended questions fell between 0-9.

The purpose of this training module was to (1) provide basic information about characteristics and limitations of three common disabilities found in the general PE setting, (2) introduce the S.T.E.P. model for making accommodations to PE activities, and (3) educate participants on how to appropriately use the S.T.E.P. model to make accommodations to PE activities according to the student's disability. Each purpose received one phase of the 3-phase training module. Test questions were not split evenly into thirds primarily because Phase 2 of the training module (introducing the S.T.E.P. model) was not as important as the application of the S.T.E.P. model based on the disability. With that in mind the test was created so that 40% of the questions related to the disabilities and 60% related to the S.T.E.P. model.

Questions about disabilities. Three disabilities were covered in Phase 1 of the training module (i.e., intellectual disability, physical disability, visual impairment). Intellectual disability covered 60% of the slides (27 slides), with physical disability and visual impairment each covering 20% (9 slides each). The knowledge test consisted of 10 questions related to intellectual disability, six questions for physical disability, and seven questions for visual impairment. Of these 23 questions, six were fact questions related to the disability and the remaining 17 questions required the participant to apply some knowledge about the disability in order to answer the question. The answer to each question on the test could be found within the training module.

Questions about S.T.E.P. Each letter of the S.T.E.P. model received equal weight in the training module. For the test, there were three questions about Space, four questions about Task, two questions about Equipment and three questions about People.

Equipment only had two questions because of the difficulty of writing questions about equipment where the answer was not obvious.

Questions about each phase. The online training module consisted of three phases. Phase 1 provided details about each of the three disabilities. Phase 2 introduced the S.T.E.P. model for making modifications to team sport activities. Phase 3 required the participants to apply the S.T.E.P. model, based on the disability, to a variety of team sport activities. There were 13 questions on the test that dealt with information presented in Phase 1, 12 questions that dealt with information presented in Phase 2, and 11 questions that dealt with information in Phase 3. The total number of questions is greater than 25 because some test questions covered information from more than one Phase.

The two main purposes of the training module were to provide basic information about disabilities and to teach PE teachers how to use the S.T.E.P. model to modify team sports to include students with disabilities. More than half of the test questions (n=13) dealt with information about the disabilities and the remaining 12 questions dealt with information about the S.T.E.P. model. Six test questions were factual recall questions while the remaining 19 questions required the participant to apply information from the training module in order to answer the question. The same test questions were used for both the pretest and the posttest. For a table of specifications that shows the breakdown of the test questions, see Appendix D.

Developing the test questions. The initial test questions were developed by the researcher. The questions were then distributed to two experts in the field of APE for content validity. Feedback from the content experts necessitated a significant revision of the initial test questions. The revised test questions were once again sent to the same two

content experts for feedback. After revising the test questions based on the second round of feedback from the content experts, the test questions were piloted to a small group of people with no prior knowledge of the content of the training module. The initial scores from this group of people determined that the test questions were too easy and did not appropriately discriminate. The people in this group only missed between four and 12 questions. Therefore, the test questions underwent another round of revisions with additional feedback provided by the content experts. Once the test had been revised, it was again sent to a small group of people unfamiliar with the content. The number of test questions answered incorrectly from this second group ranged from 11-16, showing that the test was better at discriminating. A few final revisions were made to the test questions after this final group of pilot testing to clarify points of confusion and to create consistency in wording, vocabulary and formatting. See Appendix E for a complete list of the test questions.

The use of a pre/post knowledge test to examine the effectiveness of online learning has been shown to be effective (Block, 2018; Kwon & Block, 2017). M. E. Block (personal communication, June 1, 2018) used a knowledge test to compare pre and post test scores of inservice PE teachers participating in an online training module about students with autism. Results of his study showed a statistically significant increase in test scores at the conclusion of the training module. Similarly, Kwon and Block (2017) used a cognitive pre and post test to determine if an e-learning supplement improved knowledge of preservice PE students in Korea related to including students with intellectual disabilities in PE.

Self-efficacy survey. The second aim of this study was to determine if the online training module was effective at increasing inservice PE teachers' self-efficacy regarding the inclusion of students with disabilities in team sport activities in the general PE setting. Similar to the knowledge test, participants took a self-efficacy survey before beginning the online training module and once again upon completion. The self-efficacy survey used in this study was the Self-Efficacy Physical Education Teacher Education (SE-PETE-D) survey developed by Block, Hutzler, Barak, and Klavina (2013). The validated SE-PETE-D survey was based on Bandura's theory of self-efficacy (Bandura, 1997), and measured a PE teacher's level of self-confidence towards including students with differing disabilities (i.e., intellectual disability, physical disability, visual impairment) in PE. It has a reliability measure for each of the three disabilities using Cronbach's alpha (i.e., intellectual disability r =.86, physical disability r = .90, visual impairment r =.92). The SE-PETE-D was divided into three parts; one for each of the three disabilities. A one-paragraph description of a secondary student with a disability was provided. The paragraph described what the student can and cannot do in the school and PE settings. Below is an example of the one-paragraph description of a student with a visual impairment:

> Sofia is a high school student. She has severe visual impairment, so she can only see people and objects when they are really close to her. She likes physical activity, and her fitness level is comparable to her peers. She needs physical assistance to safely move around physical education settings. For example, she holds onto a peer's elbow and listens to her peer's auditory cues when she does the mile run. Also, her vision is not good enough to see demonstrations, so she

needs verbal instructions and someone guiding her through the movement to understand how to perform a skill. When playing a team sport (e.g., basketball, volleyball, soccer), she needs someone with her for safety and to make sure she knows where she is on the field, and she needs a ball with auditory cues to know where the ball is during the game. Regarding her skill level, she cannot catch a ball, but she can throw or kick the ball towards an auditory target.

Following the student description, the survey was divided into three sections, one for each of the three disabilities. The first section asked participants to rate how confident they felt in their ability to conduct physical fitness testing for the student with a disability. There were three or four questions in this section and participants used a 5-point Likert scale to rate their confidence level. Scores ranged from 1 (no confidence) to 5 (complete confidence). In section two participants were asked to rate how confident they felt in their abilities to teach the basic skills of the sport (e.g., the bump, set, and serve in volleyball) to a student with a disability. There were four or five questions in this section as well. Once again, scores ranged from 1 (no confidence) to 5 (complete confidence). In section three participants were asked to rate how confident they felt in their ability to include the student with a disability in playing an actual game. There were three or four questions in this section and scores ranged from 1 (no confidence) to 5 (complete confidence). See Appendix F for the complete self-efficacy survey.

The SE-PETE-D has been used with preservice PE teachers to compare pre and post self-efficacy scores after the use of an e-learning supplement on including students with intellectual disabilities in PE (Kwon & Block, 2017), and to measure self-efficacy of preservice PE teachers in Serbia (Jovanavic, Kudlacek, Block, & Djordjevic, 2014).

Studies have also been conducted using other self-efficacy surveys that have looked at self-efficacy of PE teachers when working with students with autism (Beamer & Yun, 2014; Taliaferro & Harris, 2014), and after taking an APE class with accompanying practicum experience (Taliaferro, Hammond, & Wyant, 2015).

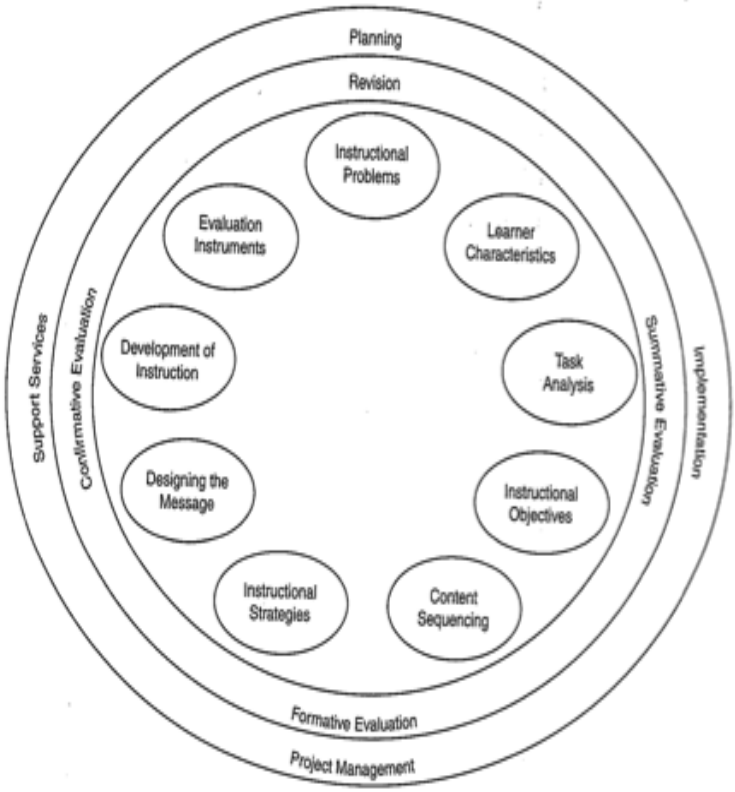
Intervention

The self-created online training module used for this study was developed following Morrison et al., (2013) nine-element instructional design model. The design and layout of the online training module was developed following Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2009). Finally, a formative evaluation plan was used throughout the design process that follows Tessmer's model (1995) for planning and conducting formative evaluations.

Instructional design model. Morrison et al. (2013) created an instructional design model with nine elements that described the process for creating effective online instruction. The instructional design model began with identifying the instructional problem, defining the learner and the context, conducting a task analysis, identifying the instructional objectives, appropriately sequencing the content, selecting the instructional strategy to deliver the content, designing the message, developing the instruction and evaluating the instruments. These elements overlap and there was not a set sequence or order that the instructional designer must follow. Lastly, the entire instructional design process was iterative and each element of the model may undergo numerous revisions throughout the design process. The entire process began with identifying the instructional problem. (See Figure 1 for a diagram of the instructional design model and Appendix G for copyright permission).

12 1 • Introduction to the Instructional Design Process

FIGURE 1-1
Components of the instructional design plan



Instructional problem. The first step in the instructional design process was to identify the problem that needed to be solved. In this case, the problem was: Can an online training module on inclusion in team sport activities in the general PE setting improve a PE teacher's self-efficacy toward including students with disabilities in team sport activities in the general PE class? Specifically, can the online training module increase: (a) the content knowledge of inservice PE teachers related to including students with disabilities in their team sports classes before and after taking online training

module, and (b) the self-efficacy levels of inservice PE teachers related to including students with disabilities in team sport activities before and after taking an online training module?

Learner and context. Once an instructional problem has been identified, the next step was to identify the characteristics of the target audience. These characteristics may include education level, work experience, and specific training related to the area of study. The participants in this study were secondary PE teachers. Common characteristics of secondary PE teachers include age (at least 21), state teaching license in PE, possession of a college degree (hopefully in PE), and participation in at least one course on APE during undergraduate training.

Task analysis. Another important element in the design process was analyzing the knowledge and procedures that were included in the design process to assist the learner in achieving the objectives of the training module. This step included determining what information to present in the training module as well as how that information was to be presented to the participants.

Instructional objectives. The objectives for the online training module detailed exactly what the learner was supposed to master. The instructional objectives must be aligned with the instructional problem so that if the learner masters each of the objectives, they will solve the instructional problem. There were four instructional objectives for my online training module. The first objective was to know key characteristics and limitations of three disabilities frequently encountered in PE. Objective 2 stated that the learner will know and understand the S.T.E.P. model for making accommodations to physical activities in PE. The third objective was to apply

the S.T.E.P. model to a team sport activity for each of the three disabilities. The goal of objective 4 was for the learner to feel confident in making modifications for all learners in the PE class.

Content sequencing. During this step of the instructional design process, the order in which information is presented was determined. The online training module divided the content into three phases. In Phase 1 information was presented about each of the disabilities. In Phase 2 the S.T.E.P. model was introduced, and in Phase 3 the participants learned how to apply the S.T.E.P. model to PE activities based on the disability learned about in Phase 1.

Instructional strategies. Designing and creating innovative methods for presenting the content was the purpose of this element. Instructional strategies may be as simple as presenting an article for the learner to read, or it may be as complex as a computer simulation of a real-world experience. Instructional designers usually have the ability to be creative when designing instructional strategies. There were a number of different instructional design strategies used to present the content in the online training module. Information was presented in Phase 1 in the form of PowerPoint slides that the learner could access and review at their own pace. Learners had to answer a case study to show their understanding of the disability. A video was shown in Phase 2 that captured a professor explaining the S.T.E.P. model using a PowerPoint presentation. In Phase 3 learners watched videos and answered prompts on the application of the content presented in Phases 1 and 2. After being guided through making modifications to basketball and volleyball, learners then had to transfer that knowledge to the sport of soccer.

Designing the message. During this step of the instructional design process the pattern of words and pictures was determined that was used to communicate with the learners. The principles for Mayer's theory for multimedia learning were used to during this step of the process. Extraneous material was limited, content was delivered in an easy-to-understand format, and fonts, colors and formatting were carefully selected.

Development of the instruction. This part of the instructional design process involved putting together all the different parts that made up the instructional materials. This included the lecture, videos, pictures, or templates.

Evaluation instruments. The evaluation instruments are the tools that were used to measure the learner's mastery of the objectives. This included the knowledge test as well as the case study examples and the application of the S.T.E.P. model to soccer. At each of these points the learner was required to provide answers to determine their level of understanding.

These nine elements of the instructional design model guided the creation and design of the online training module. While some elements may have received more attention than others, together they were instrumental in creating a training module that was in line with the research on how to design online instruction. To see the complete process of how each of the nine steps was used to guide the creation of the online training module, see Appendix H.

Multimedia learning model. The nine-step instructional design plan designed by Morrison et al. (2013) provided the framework for the creation of the online training module. However, the instructional design plan did not include information regarding the delivery of the content. Richard Mayer's Cognitive Theory on Multimedia Learning

(2009) was used to create the online training module. Mayer's Cognitive Theory of Multimedia Learning was based on three assumptions. The first assumption was that there are two separate channels for processing information. One process is the auditory process and the other is the visual process. The second assumption explains that only a limited amount of information can be processed by each channel at one time. That is, too much auditory or visual information at one time may overwhelm the channel and limit the amount of information that can be processed. The final assumption guiding the cognitive theory of multimedia learning was that humans are active learners in this process and not passive recipients of information. From these three assumptions Mayer created 12 instructional design principles that helped to reduce the extraneous cognitive processing, manage essential processing, and foster generative processing. These 12 principles were coherence, signaling, redundancy, spatial contiguity, temporal contiguity, segmenting, pre-training, modality, multimedia, personalization, voice, image. An in-depth description of all 12 principles was beyond the scope of this article, but how some of the 12 principles were incorporated into the training module was explained below.

Coherence principle. People learn better when extraneous material was excluded. The premise behind this principle was that only essential material is provided to the learner. Any material that is not necessary for learning is excluded, thus helping the learner focus on only what is essential. In the creation of my online training module I tried only to keep what was essential to the learning. I avoided adding pictures or text that did not serve an immediate purpose. This was difficult because at times I felt like the training module needed to be enhanced with pictures or more text, but I only included pictures when they were important to the content.

Signaling principle. The purpose of the signaling principle was to highlight the organization of the material before presenting it to the learner. Signaling is a way to guide the learner's attention to the key elements of the presentation. I used signaling in many ways. First, I provided an overview at the beginning of the training module of what the learner will be doing and learning throughout. At the beginning of each phase I included a slide outlining what the learner will be doing in that particular phase of the training module. I also used headers to introduce new concepts and to separate the different sections within each phase.

Segmenting principle. The idea behind the segmenting principle was that people learn better when the content is presented in user-paced segments instead of as one large, continuous unit. My entire training module was self-paced, meaning the user could stop and start whenever they liked, they could proceed as quickly or as slowly as they liked, and they could go back and review any previous material at any time. Additionally, the training module was divided into three distinct phases to limit how much information was presented at one time.

Modality principle. Using pictures and spoken words was more effective than using pictures and printed words. One phase of the online training module consisted of a lecture on the S.T.E.P. that included slides following the modality principle. Additionally, where pictures were used, text was limited and where text was used, the use of pictures was limited.

Multimedia principle. This principle simply stated that people learn better from words and pictures than from words alone. While I tried to minimize the extraneous material (see the coherence principle above), I did include a number of pictures to the

training module to aid the learner in understanding and comprehending the material. For example, when describing what an individual with an intellectual disability might look like, people may vary significantly in what they think an individual with an intellectual disability looks like based on their prior experiences with people with an intellectual disability. By providing a picture of an individual with an intellectual disability not only am I providing the learners with the same reference point, but I am reducing the cognitive load for the learner by providing them with a visual example.

Voice principle. The voice principle was simply that the information was presented by a human voice instead of a machine voice. In the online training module, I recorded my own voice for all auditory instructions and the lecture of a professor teaching about the S.T.E.P. model was recorded so that what was heard was the professor's voice. No machine voice was present in the training module.

Creating effective online learning requires limiting the amount of extraneous cognitive processing required of the learners, managing essential processing to help the learners focus on the critical information being presented, and fostering generative processing that allows the learners to become active learners in the learning process. The 12 principles of Mayer's Cognitive Theory of Multimedia Learning provided the framework for what content was included in the online training module and how that content was presented.

Formative evaluation model. Understanding how to design an online training module using theory and research, and then developing the online training module using multimedia theory will hopefully assist the learner in increasing knowledge and self-efficacy toward including students with disabilities in the general PE class. However,

throughout the course of its development, the online training module was constantly undergoing evaluation to make the instructional materials more effective (Tessmer, 1995). During the initial stages of development, the online training module was sent to a small group of peers on a weekly basis for feedback. This feedback was regarding the proper use of Morrison's et al. (2013) nine-element instructional design model and Mayer's (2009) theory of multimedia learning. The online training module was also frequently reviewed by three instructional design experts who provided feedback that improved the design of the training module. Once the complete online training module was developed, an official formative evaluation process was undertaken following Tessmer's (1995) model for planning and conducting formative evaluations.

According to Tessmer (1995), formative evaluation "is a judgement of the strengths and weaknesses of instruction in its developmental stages, for purposes of revising the instruction to improve its effectiveness and appeal" (p. 11). In Tessmer's formative evaluation model there were four recognized types of formative evaluation. The first type of formative evaluation was the expert review in which subject matter experts and/or instructional design experts reviewed the instruction and provided feedback on the content or the design of the instruction. The second type of formative evaluation was the one-to-one evaluation where one learner at a time reviewed the instruction with the evaluator. In the third type of formative evaluation, a small group of learners, similar to the target audience, reviewed the instruction, and in the fourth type of evaluation the instruction was field-tested in a realistic environment. The online training module used in this study underwent a formative evaluation using the first three types of formative evaluation presented by Tessmer (i.e., expert review, one-to-one, small group).

The field test was not necessary for this training module because the purpose of the field test was to evaluate the product in the same environment that was used it when it was complete. Since the online training module used in this study was a website that could be accessed from any computer, it was not necessary to perform a field test.

Expert review. The purpose of the expert review was to evaluate the instruction "in terms of intrinsic merits such as content accuracy or technical quality" (Tessmer, 1995, p. 47). The focus of the expert review was on content accuracy, effectiveness of content delivery methods, and efficiency in instructional design and strategy. Two experts, one subject matter expert in the field of APE and one instructional design expert, participated in the evaluation. Following an evaluation protocol that was provided them, these experts provided feedback on the overall effectiveness of the design, the color scheme and formatting of each slide, the appropriate use of instructional strategies and the flow of the training module. Feedback from the expert reviewers was incorporated into the online training module before the training module was sent for the small group review. See Appendix I for a list of the expert review protocol.

One-to-one. Concurrent with the expert review, three separate, individual one-to-one reviews were conducted. The purpose of the one-to-one review was to gather feedback from the point of view of the learner. The focus of the one-to-one evaluation was to receive feedback on the user-friendliness of the training module. One way to accomplish this was to perform one-to-one reviews with three different levels of learners. One learner with a low knowledge of the content, one learner with a medium amount of knowledge regarding the content, and one learner with a high level of knowledge regarding the content. By employing a low, medium and high learner, different potential

areas of concern were identified by the different ability levels of the learners. During this evaluation I sat next to the learners as they took part in the training module. Being in the room allowed me to ask questions, observe reactions, and identify areas where instruction was unclear or where content was boring. Rather than focus on each particular slide of the training module, learners in this group answered questions about each overall phase and whether the information was presented clearly, whether the instructions were explicit and what improvements could be made to make the training module more user-friendly. The amount of time required to complete the training module was also evaluated by this group. Information was gathered from observation and the interaction between the researcher and the reviewers while the reviewers participated in the online training module. The feedback gathered from these one-to-one interviews was used to revise the training module before the online training module was presented to the small group. See Appendix J for a list of the one-to-one review protocol.

Small group. A group of three reviewers, similar in learner characteristics to the target audience, were provided access to the online training module and given two weeks to complete it. Unlike the one-to-one reviews, the researcher was not nearby to answer any questions. The reviewers were provided a list of questions to answer regarding the use and interaction of the training module, and an evaluation protocol to follow. Feedback from the small group was used to make final revisions before the online training module was ready to be used in the study. See Appendix K for a list of the small group review protocol.

The use of three different sets of reviewers provided a wealth of feedback about the technical quality of the online training module, the accuracy of the content, the

usability of the program, and the effectiveness of the instruction. See Appendix L for a complete analysis of the formative evaluation process.

Online training module. A three-phase, asynchronous, online training module was created using the software program Articulate 360. Articulate 360 is a professional-grade software program used for designing e-learning courses. Articulate 360 is similar in design and function to PowerPoint, but with significantly more design capabilities. A self-paced, asynchronous design was chosen for the online training module because the participants in this study are inservice PE teachers located throughout the United States. The self-paced feature allowed the participants to work at a time and pace that was appropriate for them, and was also an important component of adult learning theory (see Knowles, Holton, & Swanson, 2015). The online training module was asynchronous because it also allowed the learner to access the training module when it was convenient for them, but also because the potential geographical dispersion of the learners made a synchronous course problematic.

Phase 1. Phase 1 of the training module introduced the learners to the characteristics and limitations of three common disabilities (i.e., intellectual disability, physical disability, visual impairment). These three disabilities were chosen because physical, sensory, and intellectual disabilities have been shown to "cause the greatest challenges when including students" (Hutzler, 2003). Additionally, they were disabilities commonly found in the general school setting. After learning about the characteristics of each disability, learners read a case study for each disability and were required to provide a short essay response in regards to the situation presented (An example of a case study can be found in Appendix M).

Phase 2. In Phase 2 the learners were presented with the S.T.E.P. model for making modifications in PE. The S.T.E.P. model (Roibas, Stamatakis, & Black, 2011) provided a guideline for making modifications to **s**pace, **t**ask, **e**quipment and **p**eople so that students with disabilities could participate in physical activities in the general PE setting. The S.T.E.P. model is similar to other modification models such as the Games Design model by Morris and Stiehl (1999) and the T.R.E.E. model created by Downs through the online blog "The Inclusion Club" (http://theinclusionclub.com). None of these models have been scientifically validated, but each provided a framework for making modifications in PE. The S.T.E.P. model was chosen over the other models due to its simplicity and ease of use. During Phase 2 of the training module the learners became familiar with the S.T.E.P. model by watching a video of a professor teaching a lecture about the S.T.E.P. model.

Phase 3. In Phase 3 the learner combined the disability information from Phase 1 with the modifications from Phase 2 to appropriately modify PE activities based on a particular disability. Learners watched a video of a typical PE class playing a team sport activity (either basketball or volleyball). Each component of the S.T.E.P. model was introduced with a video clip showing how that would look in a PE setting. After each component of the S.T.E.P. model had been introduced, the learners watched a video clip of a PE class participating in a team sport activity with students with disabilities included in the class. Different components of the S.T.E.P. model were used by the students in the video, and the learner identified which components were used. The learner then repeated this process for the other team sport activity (either basketball or volleyball). Lastly, the learner wrote down the modifications they would make for the sport of soccer following

the S.T.E.P. model, based on the examples that were provided for basketball and volleyball in the training module. The team sport activities of basketball, soccer and volleyball were chosen because they were: (1) team sport activities, (2) part of the secondary PE curriculum, and (3) common PE activities taught throughout the country.

Once the learner completed all three phases of the training module they again took the knowledge test and the self-efficacy survey. A short evaluation of the online training module asked for their thoughts about the training module and whether they felt the training module was useful (see Appendix N for the evaluation questions).

Data Collection

Participants in the experimental group were given a three-week time period to complete the online training module. The first step of the training module was to complete the content knowledge pre-test. This was almost immediately followed by the self-efficacy survey. When the participants completed the online training module they once again took the content knowledge test and the self-efficacy survey. Participants could complete these tests and the training module at any point during the three-week time period. Participants in the control group were emailed a link to the content knowledge test at the same time the experimental group was beginning the training module. At the conclusion of the three-week time period, the experimental group was then given access to the training module, which included the content knowledge test which they took for a second time. They also were given three weeks to complete the training module. Three weeks was chosen as the time frame to allow participants to complete the online training module at their own pace, while also providing a reasonable time limit to complete the training module. A difference of three weeks between pre and

post tests for knowledge and self-efficacy was also needed to account for recency bias and testing bias (taking the posttest shortly after taking the pretest and being familiar with all of the questions). Pre-intervention and post-intervention comparisons were made between the content knowledge test scores and self-efficacy scores to determine if scores improved after the participants participated in the online training module.

During Phase 1 of the online training module participants learned about each of the three disabilities. A case study was provided at the conclusion of the presentation for each disability to determine whether or not the participants understood how to adapt PE lessons for a student with that particular disability. Qualitative data from each of the case study answers (one case study for each disability) was gathered. No data were gathered during Phase 2 of the online training module.

During Phase 3 of the online training module participants learned how to apply the S.T.E.P. model to basketball and volleyball for each of the disabilities. The participants were then required to describe the modifications they would make for soccer for each of the three disabilities. The total number of modifications for each component of the S.T.E.P. model was collected. Additionally, qualitative data for each of the three disabilities were also collected and analyzed.

At the conclusion of the training module a series of evaluation questions was provided for the participants to provide feedback on the online training module. This feedback was essential in determining the value of the training module and whether or not PE teachers felt it was worth their time.

Additionally, the total amount of time each participant spent accessing the online training module, as well as whether or not the participants accessed each component of

the training module, was collected. It was not possible to gather information regarding time spent on each Phase of the training module, but total time spent was available as well as whether or not the participants accessed each component of the training module.

Content knowledge test data, as well as case study answers, modifications for soccer, and training module evaluation questions were collected through Google Forms. The self-efficacy survey results were collected through the online survey tool Qualtrics.

Data Analysis

Using Statistical Package for the Social Science (SPSS), two, two-way repeated measures ANOVAs were used to compare the groups' pre and post knowledge test scores and self-efficacy scores. Repeated measures designs are used when testing the same group on multiple occasions (for example, a pretest and a posttest). Repeated measures typically provide more precise results because the participants act as their own controls (Vogt, Vogt, Gardner, & Haeffele, 2014). ANOVAs are used with experimental designs with a categorical independent variable (i.e., group) and a continuous dependent variable (i.e., test scores, self-efficacy scores) (Creswell, 2009), and is preferable over a *t*-test because of its versatility (Vogt et al., 2014). It also reduces the probability of a Type I error because only one analysis is being done on the data. Control group and experimental group pretest scores were examined to validate the random assignment of the participants. A covariate analysis will be used if the pretest scores are significantly different.

Participant demographic information will be analyzed to determine if other factors may have influenced a participants' score on the content knowledge test or the self-efficacy survey.

Limitations

There were a number of threats to internal validity with the design of this study. One major threat to internal validity was mortality. Online education historically has a high attrition rate because of the learner population (Means, Bakia, & Murphy, 2014). If participants take the pretest but do not complete the posttest, it will affect the results of the study. To assist in controlling for mortality, a $20-$25 gift card was provided as compensation to each participate that completed the entire online training module, including the post knowledge test and the post self-efficacy survey. Additional participants were also recruited to account for potential attrition.

Selection bias was another potential limitation of the study. It was likely that those willing to sign up for the module were more highly motivated as PE teachers and had higher levels of self-efficacy toward including students with disabilities in PE. It was possible that the participants in the study were not truly representative of the general PE teacher population. Lastly, results from previous studies measuring PE teacher self-efficacy toward including students with disabilities in PE showed that PE teachers rated themselves high on self-efficacy before any interventions had taken place (Jovanavic et al., 2014). This perceived high rate of self-confidence among PE teachers may produce a regression toward the mean on the posttest scores.

Aside from the threats to internal validity mentioned above, there were also threats to external validity. One potential threat to the external validity of the study was selection bias. Because a random sampling of the total population of PE teachers throughout the world was not feasible, convenience sampling and snowballing were used to recruit participants. Another limitation of the online training module was that the self-

paced nature made it possible for a participant to complete the entire training module in one day. A participant that completed the entire training module in one day would take the pre and post tests on the same day, thus introducing the possibility for testing and recency bias. Also, participants were not given the results of the knowledge pretest so as to not influence their answers on the knowledge posttest. Furthermore, while the online training module was created following Morrison's et al. (2013) instructional design plan, developed following Mayer's multimedia theory (2009), and undergone extensive reviews following Tessmer's (1995) formative evaluation plan, validity and reliability have not been established. Finally, it was not known what previous experiences the participants had with the content of the training module. It was not possible to account for prior knowledge and experience, which may have greatly influenced content knowledge and self-efficacy scores.

Chapter 4

Results

The purpose of this experimental design study was to determine the effectiveness of an online training module focusing on modifying team sport activities for students with disabilities. Specifically, the purposes of the study were: (a) to determine if the online training module significantly improved the content knowledge of inservice PE teachers related to including students with disabilities in team sport activities within the general PE setting, and (b) to determine if the online training module significantly improved the self-efficacy levels of inservice PE teachers related to including students with disabilities in team sport activities within the general PE setting before and after taking an online training module.

Participants

A total of 51 physical education teachers across the country expressed interest in participating in the study. They were randomly assigned to either the control group (n=29) or the experimental group (n=22). Initially there were 26 participants in the experimental group and 25 in the control group, but once it was determined that a control group was not going to be used in the study, and due to the need to collect all the data in a timely manner, the final three participants were switched to the experimental group before they began the training module. They were each given a start date along with a three-week timeframe to complete the entire training module. Those assigned to the control group were given a three-week timeframe to complete a pretest and a pre self-

efficacy survey, followed by another three-week timeframe to complete the online training module. As soon as participants began the online training module they were instructed to once again take the pretest and the pre self-efficacy survey, and once they completed the training module they were instructed to take the posttest and the post self-efficacy survey. Of the 29 participants assigned to the experimental group, 19 completed the initial pretest, and 18 completed the pre self-efficacy survey. Of the 22 participants assigned to the control group, 20 completed the initial pretest and 17 completed the pre self-efficacy survey. An independent samples t-test was used to determine whether or not the random assignment was effective at randomly assigning participants to either the control group or the experimental group. Pretest scores for content knowledge for those assigned to the experimental group (M=11.95, SD=2.88) and those assigned to the control group (M=12.3, SD=3.21) were not significantly different ($t_{(37)}$=-.360, p=.721).

However, a significant number of participants had technical issues accessing certain parts of the training module, and most of those initially assigned to the control group failed to take the comparison pretest and pre self-efficacy survey once they began the online training module. By the time the researcher discovered this error, the participants had already completed portions of the training module, thus eliminating the possibility that the participants could provide an unbiased answer on the pretest and the pre self-efficacy survey. Only two participants from the control group completed both pretests and pre self-efficacy surveys along with the posttest and the post self-efficacy survey. As a result, it was decided that all participants would be moved to the

experimental group and there would be no control group for this study. For the two participants that completed both pretests and pre self-efficacy surveys, only data from the first pretest and the first pre self-efficacy survey was used, as this was the first time they were responding to the questions.

A total of 25 participants completed the entire training module and comprised the final sample in this study. Demographic information was collected from the participants asking about the following: Age, gender, education, PE license, number of previous APE courses taken, PE teaching experience, and experience interacting with students with intellectual disabilities, physical disabilities and visual impairments.

Age. Participants had the option of choosing between 21-30 years, 31-40 years, 41-50 years, 50+ years, or prefer not to answer. A total of 10 participants (42%) were between 21-30 years of age, eight participants (32%) were between 31-40 years old, three participants (12%) were between 41-50 years old, and four participants (16%) were 50+.

Gender. A total of seven participants (28%) were male and 18 participants (72%) were female.

Education. All of the participants possessed a college degree, with 10 participants (40%) reporting that their highest level of education was a Bachelor's degree and the remaining 15 participants (60%) reported having received a Master's degree.

PE license. All of the participants (*N*=25) reported that they were licensed PE teachers, which was one of the criteria to participating in the training module.

Number of previous APE courses taken. Participants had the option of answering 0,1,2,3, or 4+ courses in APE. One participant (4%) had not taken any previous APE courses, six participants (24%) reported that they had taken one APE

course, five participants (20%) had taken two APE courses, two participants (8%) had taken three APE courses, and the remaining 10 (40%) had taken four or more APE courses. One participant did not respond to this question.

PE teaching experience. Teaching experience was divided into five categories: first year, one to five years, six to ten years, 11-20 years, or 20+ years. Only one participant (4%) reported being in their first year as a teacher. Nine participants (36%) were in years one to five, four (16%) were in years six to ten, six participants (24%) were in years 11-20, and the remaining six participants (24%) had more than 20 years teaching experience.

Experience interacting with students with ID, PD, VI. For each disability participants could report having no experience teaching PE to individuals with a disability, once or twice, or several experiences. For intellectual disability, only one participant (4%) reported having no experience teaching PE, whereas four participants (16%) had one or two teaching experiences, and the remaining 20 participants (80%) had several experiences. For physical disability, two participants (8%) reported having no experience, five participants (20%) had one or two teaching experiences, and the remaining 17 (68%) participants had several teaching experiences. For visual impairment, nine participants (36%) reported that they had no teaching experience, four participants (16%) reported one or two teaching experiences, and 10 participants (40%) reported several teaching experiences. Two participants (8%) did not answer this question.

Table 2

Teaching Experience According to Disability

Disability	ID			PD			VI		
Teaching Experiences (in years)	None	1-2	Several	None	1-2	Several	None	1-2	Several
# Participants	1	4	20	2	5	17	9	4	10

Table 3

Participant Demographic

Participant ID	Gender	Age (years)	Education (degree)	# APE courses taken	PE teaching experience (years)
1	F	31-40	Masters	2	6-10
2	F	21-30	Bachelors	4+	1-5
3	M	31-40	Masters	2	11-20
4	F	21-30	Masters	4+	1-5
5	F	21-30	Masters	4+	1-5
6	F	50+	Masters	1	20+
7	F	50+	Masters	1	20+
8	F	31-40	Bachelors	0	6-10
9	M	21-30	Masters	4+	1-5
10	M	21-30	Masters	4+	1-5
11	F	31-40	Masters	4+	11-20
12	F	21-30	Masters	1	1st year
13	F	21-30	Masters	2	1-5
14	F	50+	Masters	4+	20+
15	M	21-30	Bachelors	4+	1-5
16	M	31-40	Bachelors	2	11-20
17	F	50+	Bachelors	3	20+
18	M	21-30	Bachelors	1	1-5
19	F	31-40	Masters	4+	6-10
20	F	31-40	Masters	4+	6-10
21	F	31-40	Bachelors	2	11-20
22	F	21-30	Bachelors	N/A	1-5
23	M	41-50	Bachelors	1	11-20
24	F	41-50	Masters	1	11-20
25	F	41-50	Bachelors	3	20+

Knowledge

The knowledge test consisted of 25 multiple-choice questions and three open-ended questions. The three open-ended questions and responses will be discussed following Table 4. Some questions were simple questions about the content of the training module that could be retrieved from the training module, while other questions were application questions that required the participants to use information from the training module and apply it to a particular situation. All 25 participants completed both the 25-question pre and post knowledge tests. A paired samples t-test was used to compare pre and post test knowledge scores. Analysis of the data revealed a statistically significant difference between pretest scores (M=12, SD=2.81) and posttest scores (M=17.2, SD=3.2), $t_{(24)}$=-6.868, p=<.001.

Table 4

Pre/Post Test Comparison

Participant ID	**Pretest score (max=25)**	**Post test score (max=25)**	**Difference +/-**
1	11	20	+9
2	13	20	+7
3	7	16	+9
4	15	22	+7
5	8	11	+3
6	14	14	0
7	16	15	-1
8	11	19	+8
9	14	17	+3
10	12	14	+2
11	14	17	+3
12	13	12	-1
13	11	13	+2
14	11	23	+12
15	11	23	+12
16	15	20	+5
17	13	20	+7
18	14	16	+2

19	12	16	+4
20	12	16	+4
21	13	18	+5
22	5	15	+10
23	14	15	+1
24	6	17	+11
25	12	22	+10

The following question was missed by all 25 participants on the pretest:

5. Which of the following spinal cord injury descriptions would be classified as "functional"?
   a. Complete/incomplete
   b. C-4
   c. Quadriplegia
   d. Sacral lesion

Upon taking the posttest after having completed the online training module, only five participants answered the question correctly. Another question was answered correctly by all 25 participants on both the pretest and the posttest:

14. According to the S.T.E.P. model, giving students one point if they shoot the ball and it hits the backboard, 2 points if they hit the rim/net, and 3 points if they make a basket, is an example of what type of modification?
   a. Space
   b. Task
   c. Equipment
   d. People

Obviously, this question was too easy and did not add anything to the test. There were also two questions where scores stayed the same from pretest to posttest, meaning the answer was not found in the training module:

11. Providing detailed, written instructions would be an appropriate modification for children with this disability?
   a. Intellectual disability
   b. Physical disability
   c. Visual impairment
   d. This is not an appropriate modification for children with these disabilities

23. Which *People* modification would be ***most*** appropriate for a student with paraplegia

in basketball?
a. Assigning a player on the other team to also be in a wheelchair
b. Have everybody play on an 8-ft. hoop instead of a 10-ft. hoop
c. Assigning a peer buddy to push the student's wheelchair
d. Prohibit opposing players from stealing the ball or blocking their shot

Finally, there was actually one question where twice as many participants answered the question incorrectly on the posttest as they did on the pretest:

22. Which *Equipment* modification would be ***most*** appropriate for a student with a physical disability in volleyball?
a. A ball that makes noise
b. A large, slow-moving ball (like a beach ball)
c. Placing all students in a wheelchair to level the playing field
d. Lowering the net

This question was clearly not a good question as scores should have improved on the posttest, not worsened. Table 5 provides a breakdown of how each question was answered on both the pretest and the posttest. The test questions can be found in Appendix E.

Table 5

Test Analysis by Question

Test Question	# questions answered incorrectly (out of 25)		% questions answered incorrectly	
	Pre	Post	Pre	Post
1	13	3	52%	12%
2	19	6	76%	24%
3	3	1	12%	4%
4	21	7	84%	28%
5	25	20	100%	80%
6	16	8	64%	32%

7	4	2	16%	8%
8	16	11	64%	44%
9	21	10	84%	40%
10	19	11	76%	44%
11	17	17	68%	68%
12	14	7	56%	28%
13	9	4	36%	16%
14	0	0	0%	0%
15	3	2	12%	8%
16	19	12	76%	48%
17	13	8	52%	32%
18	13	4	52%	16%
19	7	5	28%	20%
20	14	7	56%	28%
21	7	1	28%	4%
22	5	10	20%	40%
23	21	21	84%	84%
24	8	4	32%	16%
25	15	14	60%	56%

Of the 25 multiple-choice questions on the test, six were strictly knowledge questions that related to information directly found on a slide in the training module. The remaining 19 questions required the participants to apply some information from the

training module in order to answer the question. Questions that related strictly to knowledge about disabilities found in the training module improved from 35% correct on the pretest to 70% correct on the posttest. Questions from the test that required participants to apply information from the training module (rather than simply regurgitate the information) improved from 53% on the pretest to 68% on the posttest.

The online training module provided examples for the participants on how to modify the sports of volleyball, basketball and soccer for students with disabilities. Participants learned the S.T.E.P. model for making these modifications and had opportunities during the training module to show their understanding of how the S.T.E.P. model could be used to modify team sport activities. The three open-ended questions asked the participants to use the information in the module about modifying activities using the S.T.E.P. model and apply it to the new sport of softball. One question asked about modifying softball for a student with an intellectual disability, one question for a student with a physical disability, and one question for a student with a visual impairment. A rubric was used to assign a score to each response. The rubric was divided into three separate areas. One area focused on the total number of modifications provided, the second area focused on whether or not the modifications were appropriate for the disability (i.e., ID, PD, VI), and the third area focused on whether or not the modifications were appropriate for the activity (i.e., softball). Scores for each area ranged from zero (unacceptable) to three (exemplary). Total scores ranged from 0-9. Each open-ended question was independently graded by two researchers. In circumstances where scores differed the two researchers met together to discuss the answer until a consensus could be reached. A paired samples t-test was used to compare

pre and post rubric scores. Analysis of the data revealed a statistically significant difference between pretest scores (M=4.96, SD=2.17) and posttest scores (M=6.88, SD=2.09), $t_{(24)}$=-3.894, p=.001.

Table 6

Pre/Post Rubric Comparison

Participant ID	Pretest score (max=9)	Post test score (max=9)
1	5	6
2	5	9
3	3	7
4	9	9
5	0	4
6	7	9
7	3	7
8	5	8
9	8	9
10	7	6
11	8	9
12	8	3
13	3	5
14	3	8
15	4	9
16	6	5
17	1	4
18	5	5
19	5	4
20	5	9
21	4	9
22	5	8
23	6	7
24	4	4
25	5	9

Self-Efficacy

The SE-PETE-D survey (Appendix F) asked participants to rate how confident they felt working with students with three different disabilities (i.e., ID, PD, VI) in

different circumstances in the PE setting. A total of 33 questions comprised the SE-PETE-D survey, with 11 questions asking about a person's self-confidence working with individuals with ID, 12 questions regarding individuals with PD, and 10 questions regarding individuals with VI. Participants rated themselves between 1 (no confidence) and 5 (complete confidence). The total possible aggregate score for the SE-PETE-D survey was 165 with the mean cumulative score between 1-5. A paired samples t-test was used to compare total pre and post rubric scores. Analysis of the data revealed a statistically significant difference between pretest scores (M=124.88, SD=20.97 with a mean score of 3.78) and posttest scores (M=146.4, SD=19.44 with a mean score of 4.44), $t_{(24)}$=-5.897, p=<.001.

Table 7

Pre/Post SE-PETE-D Comparison

	Pre	**Post**
Aggregate (max=165)	124.88	146.4
Mean score (1-5)	3.78	4.44
ID aggregate (max=55)	41.24	48.08
ID mean (1-5)	3.75	4.37
PD aggregate (max=60)	46	53.96
PD mean (1-5)	3.83	4.5
VI aggregate (max=50)	37.64	44.36
VI mean (1-5)	3.76	4.44

Demographic Factors

A 2X2 ANOVA was run to determine whether gender was a factor in test score differences. Results of the ANOVA showed that no statistical significance was found in pretest and posttest scores based on gender (p=.964). To determine whether or not other demographic variables played a significant role in test score differences, a nonparametric Spearmon's Rho Correlation was used. The only demographic variable that showed

statistical significance on pretest and posttest scores was the number of APE courses a participant had taken prior to participating in the training module (.577 and .510 respectively). Those participants that had taken three or more APE courses improved their test scores by 4.3 questions on the posttest. In contrast, those participants that had zero or one APE course improved their test scores by 5.6 questions. For those participants with a Master's degree, posttest scores improved by 5.4 questions compared to only 4.9 for those with only a Bachelor's degree.

Additional Data

The total amount of time spent on the training module was tracked for 20 of the 25 participants (technical issues with the training module resulted in the loss of data for the other five participants). Results showed that the mean amount of time spent on the training module was 92 minutes with the range between 21 minutes and 390 minutes. The 390 minutes reported by one participant was an outlier. Removing that data point results in the mean time spent on the training module was 77 minutes.

Table 8

Data by Participant

ID	M/F	Age	Education	# of APE	Years teaching	Pre test	Post test	Pre SE	Post SE	Pre rubric	Post rubric	Time
1	F	31-40	Masters	2	6-10	11	20	131	135	5	6	109
2	F	21-30	Bachelors	4+	1-5	13	20	127	151	5	9	93
3	M	31-40	Masters	2	11-20	7	16	145	154	3	7	N/A
4	F	21-30	Masters	4+	1-5	15	22	115	161	9	9	77
5	F	21-30	Masters	4+	1-5	8	11	113	114	0	4	N/A
6	F	50+	Masters	1	20+	14	14	126	124	7	9	21
7	F	50+	Masters	1	20+	16	15	116	117	3	7	73
8	F	31-40	Bachelors	0	6-10	11	19	110	157	5	8	71
9	M	21-30	Masters	4+	1-5	14	17	153	161	8	9	84
10	M	21-30	Masters	4+	1-5	12	14	164	165	7	6	33
11	F	31-40	Masters	4+	11-20	14	17	153	156	8	9	57
12	F	21-30	Masters	1	1st year	13	12	152	161	8	3	22
13	F	21-30	Masters	2	1-5	11	13	118	132	3	5	N/A
14	F	50+	Masters	4+	20+	11	23	112	124	3	8	N/A
15	M	21-30	Bachelors	4+	1-5	15	20	117	162	4	9	N/A

16	M	31-40	Bachelors	2	11-20	13	20	109	137	6	5	48
17	F	50+	Bachelors	3	20+	13	18	82	97	1	4	84
18	M	21-30	Bachelors	1	1-5	14	16	126	165	5	5	133
19	F	31-40	Masters	4+	6-10	12	16	132	165	5	4	40
20	F	31-40	Masters	4+	6-10	13	20	122	165	5	9	117
21	F	31-40	Bachelors	2	11-20	13	18	142	156	4	9	123
22	F	21-30	Bachelors	N/A	1-5	5	15	85	148	5	8	54
23	M	41-50	Bachelors	1	11-20	14	15	150	165	6	7	48
24	F	41-50	Masters	1	11-20	6	17	97	132	4	4	172
25	F	41-50	Bachelors	3	20+	12	22	125	156	5	9	390

One tenet of adult learning theory is that adults want to be in charge of their learning. They want to control the pace and speed with which they receive information. One question in the evaluation asked whether the participants preferred the delivery of information in Phase 1, which consisted of a standard PowerPoint-like presentation that allowed participants to access the information at their own pace, or whether they preferred how the information was presented in Phase 2, which consisted of a university professor standing at the front of a classroom and reviewing a slideshow presentation. While only 20 of the 25 participants responded to the evaluation questions, results show that 80% of those responding (n=16) preferred the information presented in slide format, whereas only 20% (n=4) preferred the videotaped lecture.

Finally, of the 20 participants that responded to the evaluation questions, 90% (n=18) reported that the training module was worth their time, 75% (n=15) reported that they would recommend it to others, and 95% (n=19) said that the objectives of the training module were met. Additionally, some comments evaluating the online training module include:

- I think this was an awesome training module! Worth the time and even someone with a minor in APE (teaching General Ed with Adapted Experience) I will look differently at how I teach my General PE classes.

- Can you make this available to schools to use for their PE departments? I think this is a great review for those of us who have been out of school for quite a few years and a great help for those of us who don't work with students with disabilities often.
- I did learn a lot, I specifically like what I learned about the VI modifications. I never thought of using a hockey stick in lieu of a person's legs/feet for soccer. I also appreciated the advice regarding using a stick to tap targets, etc. to help direct a student with a VI disability.

Not all of the comments were positive. A number of participants expressed frustration with the technical issues they experienced during the module, and a few participants had other less-than-positive responses. Those include:

- Other PE teachers will complain about the time for this.
- The only suggestion I have is with the post-test. I felt that more than one modification was appropriate at times, and when I went back and looked at the presentation again, I found that some of your questions did have more than one appropriate response.
- Maybe a little more interactive, and see results if possible.
- More details on the students with disabilities. The first part when they walk in was not very helpful.

Chapter 5

Discussion

A significant portion of students with disabilities are being included in the general PE class (NCHPAD, 2016). However, PE teachers consistently report not feeling adequately prepared to include them in their general PE classes (Obrusnikova & Block, 2016). Additional training is needed for PE teachers to feel competent including students with disabilities in the general PE class. One possible solution to providing additional training for inservice PE teachers is through the use of online education. The use of online education for training for teachers is becoming more and more common (Means et al., 2014). Unfortunately, the use of online education for PE teachers, and specifically PE teachers working with students with disabilities, is very limited. The limited amount of research available, however, does show the potential for online education in providing additional training for PE teachers (Healy, Block, & Kelly, in press; Kwon & Block, 2017). The present study used Knowles' adult learning theory and Mayer's Cognitive Theory of Multimedia Learning to guide the creation of an online training module for PE teachers on including students with disabilities in team sport activities in the general PE setting. It adds to the limited research on the use of online education in PE and hopefully provides a guide or framework for future researchers when designing online education.

Limitations

The loss of a control group significantly altered not only the research design, but also the research questions. Thus, in order to adequately understand this study, one must

understand its limitations. Although every effort was made to minimize potential limitations for this study, a number of limitations were still present in this study.

- The training module was designed using the Articulate 360 software and uploaded to the learning management system of a large university. The training module was designed to be web-browser agnostic, and available across all technological mediums (e.g., laptop, desktop, tablet, phone). Links were inserted into the training module that directed participants to either Google forms or Qualtrics for recording answers. Because of the restrictions of the learning management system to incorporate users not affiliated with the university, full editing access was given to each participant for each Google form. This became a significant issues as numerous participants encountered issues when using the Google forms to record answers. For many participants the Google form did not allow them to enter a response, but it did allow them to edit the Google form itself. This resulted in a number of participants erasing the previous responses of other participants, and resulted in some data being lost. Some participants were able to get around the problem by switching to a different web browser, and some participants were able to access the Google forms when provided a different link. However, a few participants were still unable to provide answers using the Google forms and one participant dropped out of the study because of the technical issues. When asked to evaluate the training module, numerous participants expressed frustration with the technical issues that arose when submitting responses.

- In order to track a participants' responses, each participant was assigned an ID (e.g., A4, B22). Some participants failed to note their ID when submitting a response, and the researcher failed to provide a place for participants to note their ID on two of the Google forms, thus eliminating the possibility of identifying what answers came from which participants. These errors did not affect the main research questions about pre/post knowledge scores and pre/post self-efficacy scores, but it limited the amount of information that could be gleaned from the data.
- This study was designed to have an experimental group and a waitlist control group. Participants were randomly assigned to one of the two groups. The experimental group was sent the link to the training module and given three weeks to complete it. The control group was sent a link to the pretest and the pre self-efficacy survey and given three weeks to complete it. Immediately following that three-week time period, the control group was then sent the link to the training module and given three weeks to complete it. At the very beginning of the online training module was a link to the pretest and the pre self-efficacy survey. For reasons unknown, most of the people in the control group failed to take this pretest and pre self-efficacy survey. They skipped over this part of the training module and immediately began Phase 1. By the time the researcher was able to discover this oversight, it was too late for the participants to take the pre-test because their answers would have been influenced by what they had already seen in the training module. The participants continued with the online training module and took the posttest and the post self-efficacy survey at the end of the

module. But because they had skipped over the second pretest, only a pretest and a posttest was recorded, thus eliminating the ability to have a control group. This lack of a control group significantly altered the focus of the research. Results of the study must be examined carefully and with caution as the lack of a control group makes it difficult to know what accounted for the differences in pre and post scores.

- Participant attrition was another limitation of this study. 51 participants expressed interest in participating in the training module, only 39 participants completed some part of the training module, and only 25 participants completed the entire training module. One participant dropped out because of the frustration experienced while trying to submit responses, and four participants withdrew from the study because of a lack of time. Knowing that attrition is a concern in online education (Stanford-Bowers, 2008), several methods were preemptively employed to combat it. More participants than were needed were recruited to participate. An a priori power analysis the number of participants needed for the study to be between 28-46. For this study 51 PE teachers were ultimately recruited to participate. Emails were sent at the halfway point of the three-week timeframe as well as three days prior to the end of the three weeks. Additionally, participants completing the entire training module had the choice of receiving either a $20 Visa gift card or a $25 Amazon gift card. Despite these efforts, only 25 participants completed the entire training module.
- The recruitment of participants was also a limitation of this study. A detailed plan was created to recruit participants across the country using multiple means of

recruitment. The initial attempt to recruit participants following this plan proved unsuccessful as only a handful of PE teachers responded. Thus, another recruitment plan was conceived to reach an even broader target audience. This attempt succeeded at recruiting more participants, but the total number of participants needed for the study was still significantly below the intended target. A third recruitment plan was created that relied on the networking contacts of an APE professor in the mid-Atlantic region of the U.S. This recruitment strategy proved successful at recruiting a sufficient number of participants to reach the target number (i.e., 48 participants), but most of these participants were from one single state and most of them had a background in APE.

- Testing bias was a significant limitation for this study. Even though a three-week time period was supposed to elapse from the time a participant took the pretest to the time a participant took the posttest, it was possible for a participant to take the pretest and the posttest on the same day, or within a very short time period.
- Another limitation of this study was the lack of feedback provided to the participants. Participants were never made aware of their pre or post test scores so they had no way of knowing whether or not their answers were correct. Also, although numerous opportunities were provided in the training module for participants to respond to case studies and making modifications, no feedback was provided for them. This lack of feedback essentially meant that participants could respond in any manner without worrying about their responses being appropriate or correct and may have affected the performance of the participants.

- Finally, demographic information was collected from the participants, but upon analyzing the data it was clear that the demographic information collected was not very useful. Instead of asking for the age of the participants, the demographic questionnaire provided a range of ages. This was also the case for teaching experience. Instead of having a mean age for the participants, or a mean number of years teaching experience, the researcher only has a range of years which makes it difficult to extract useful conclusions from this data.

Knowledge

The lack of a control group not only altered the research design used for this study, but also altered the research questions. Based on the limitations of my sampling, the research questions were modified slightly.

Research Question #1

How does the online training module effect inservice PE teachers' content knowledge regarding including students with disabilities in team sport activities in the general PE class?

The findings from this study demonstrate positive support that the use of an online training module helped PE teachers improve their basic knowledge regarding one approach to teaching students with select disabilities in PE and helped them modify select team sport activities so that students with disabilities can be included more fully in the PE setting. Overall test scores improved 21% from pre to post with 22 of the 25 participants showing an improvement. Participants answered 48% of the pretest questions correctly and 69% of the posttest questions correctly. The test questions were divided into knowledge questions related to a characteristic of a specific disability, which required

only that the participants regurgitate information found in the training module, and application questions that required the participants to make sense of the information and use it in a real-life scenario. It was encouraging that knowledge scores doubled from 35% correct on the pretest to 70% correct on the posttest, but it is still disappointing that even after reviewing the training module the participants only correctly answered 70% of the questions. At the same time, application scores also showed an increase, this time only 15%, but the percentage of correct responses was only 68%. So, while it is true that scores improved after reviewing the training module, it is fair to question how effective the training module was if participants still did not score particularly well on the posttest.

One possible explanation for the poor test scores can be found by carefully analyzing the data. Data analysis revealed that two of the participants spent less than 30 total minutes on the training module. Considering that the training module contained 25 minutes of video, over 100 slides, five opportunities for participants to submit responses to prompts, a pre and post knowledge test, and a pre and post self-efficacy survey, one could not reasonably complete the entire training module in less than 30 minutes without skipping important information. Not surprisingly, neither of these two participants showed improvement on the pre/post test. Of the six participants that spent less than 50 minutes on the training module, only one showed a significant improvement on the posttest (defined by scoring at least four points higher on the posttest). Conversely, of the 14 participants that spent more than 50 minutes on the training module 9 showed significant improvement on the posttest (the amount of time spent on the training module was not tracked for the remaining five participants). In fact, the two participants who spent the most time on the training module showed the greatest improvement in

knowledge scores. It is reasonable to conclude that the amount of time spent on the training module impacted the amount of knowledge gained from participating in the training module.

The online training module was designed to provide additional training for inservice PE teachers with limited knowledge and experience including students with disabilities in the general PE setting. However, the participants that completed the online training module did not match this demographic. Nearly half of the participants (N=12) had taken three or more APE courses compared to only seven who had zero or one APE course (one participant did not answer this question and the remaining five had taken two APE courses). Perhaps not surprisingly, those participants that had taken fewer APE courses showed greater improvement on the knowledge posttest than those that had taken more APE courses (5.6 to 4.3 respectively). Somewhat surprisingly perhaps, is the greater improvement shown by those with a Master's degree compared to those with a Bachelor's degree (5.4 to 4.9 respectively). One would expect that those with less training would make the most gains, but these results show the opposite. Without additional demographic data on these participants it is difficult to understand why this difference was found. It may be that those with a Master's degree studied something other than PE, or it may be that a significant amount of time has passed since they were in school, or it is entirely possible that, since the scores were so close, there is no correlation. Possessing a Master's degree may not automatically make a teacher more knowledgeable, especially when it is not known in what field the degree was earned.

There is a significant difference between answering questions on how to make modifications and actually being able to make modifications. Increases in teacher

knowledge does not always correlate with improvement in teaching ability (Carlisle, Kelcey, Rowan, & Phelps, 2011). Unfortunately, a suitable method to gather behavior modification data was not possible as part of this study. Instead, three open-ended questions were posed that forced participants to explain how they would take the information from the module and use it in a novel situation. The goal of these questions was to require a similar level of thinking from the participants that would demonstrate their mastery of the modification model and their ability to apply it in their teaching. Pre and post scores for these open-ended questions showed significant improvement as well. A comparison of the three open-ended rubric questions about how to modify the game of softball for students with disabilities (after learning about soccer, basketball, and volleyball in the training module) showed an improvement of 21% from pre to post. An example of the different responses before and after participating in the training module show the improved level of thinking and understanding of the PE teacher. Before participating in the training module, one participant responded to the question, "What modifications would you make to a game of softball for a student with an intellectual disability?" by answering "I would add a coach at each base to instruct the student when to run, where to run next, and when to stop. I would add a partner in the field." Upon completing the training module this same participant responded to the same question in this manner:

> For space, I would make the playing field smaller so the student with the disability would not have to run as far between bases. For task, I would allow five opportunities to strike the ball with a slow, unhand pitch at closer range. If the student was not successful, I would allow him to take first base at the completion of five attempts. When playing the field, I would prohibit a batter from running until the student with the disability had possession of the ball. I would also allow the student to roll the ball instead of throwing the ball. For equipment, I would use a bat with a larger striking surface and I would allow the use of a T if

> necessary. I would also use a ball of a larger size and lower lighter weight to slow down the ball's velocity. I would also mark each base with a colorful cone so the bases were easier to see. For people, I would allow the student with the disability to choose a peer to help fielding the ball. I would also assign a peer to each base to act as a coach for direction.

It is apparent from this answer that the participant has a good understanding of the S.T.E.P. model and how to apply it to other PE activities. This participant was not alone in making significant improvements on the open-ended questions of the posttest. Similar improvements could be seen in a number of other participants as well whose first responses were brief or vague but who, upon completing the training module, provided responses with significantly more detail. However, not all of the participants showed a significant increase. In fact, of the 25 participants that completed the training module, seven did not show any improvement, including four participants who scored worse on the post application questions than on the pre application questions. A possible explanation as to why those four participants did not improve their application score may be found in the amount of time they each spent on the training module. All four of the participants that received a lower score on the post application questions failed to spent at least 50 minutes on the training module. Also, while the goal of the application questions was for the participants to show how to use the S.T.E.P. model for making modifications for a new activity (i.e., softball), only four of the 25 participants actually used the S.T.E.P. model when providing their response on the posttest. The remaining 21 participants provided modifications, and many of the modifications fit within the S.T.E.P. model. However, it was discouraging that only four participants answered these questions the way they were intended to be answered.

Beyond improving knowledge about disabilities and making accommodations for those disabilities, the improved scores to the open-ended questions provides hope that the participants know how to modify other PE activities. This study purposely used a different team sport (i.e., softball) for the application question than what was presented in the training module to see if participants were able to apply the principles of the S.T.E.P. model. Unlike other similar studies looking at the use of online education with PE teachers, the use of application questions was unique to this study, but other studies looking at the use of online learning have used application questions (Kennedy et al., 2016). The use of application questions is crucial in allowing the researcher to know whether or not the participants are able to apply the information in novel situations. While it is not practical to provide modifications for every activity for every possible disability, using application questions may aide the researcher in knowing whether or not the information can be transferrable to other settings.

Using a pre and posttest to measure the effectiveness of online training for teachers has been shown to be effective for both PE teachers Healy (2018), and Kwon and Block (2017), and Special Education teachers (Kennedy et al., 2016). It is perhaps not surprising that knowledge scores improved after completing the online training module. It is reasonable to assume that anybody presented with new information (in this case the S.T.E.P. model) would know more about it on a posttest than on a pretest. The knowledge test used in this study, although rigorously designed, focused mainly on the content of the training module, so it would be expected that more knowledge would be had once the training module was completed. However, knowing that knowledge scores increased after participating in the training module is still valuable information as

knowledge is related to eventually changing a behavior (in this case making modifications), and feelings of self-efficacy towards making modifications (Beamer & Yun, 2014). The results of this study further support the evidence that PE teacher knowledge can be improved through the use of online education for teacher training.

In addition to the pre and post knowledge test, an evaluation question at the conclusion of the training module asked which part of the training module participants found most useful. The answer was overwhelmingly Phase 3 (75%), where the participants applied the information about disabilities in Phase 1 and the information about the S.T.E.P. model in Phase 2 to unique PE situations. Even though the results show that test scores were improved after participating in the online training module, caution must be taken when generalizing the results of this study due to the lack of a control group. Without a control group for comparison one cannot confidently say that the online training module was the sole cause for the increase in test scores. It is possible that other factors influenced the participants and may have led to increased knowledge during the time of the study. However, given the short amount of time between the pre and posttests, it is unlikely that participants were exposed to anything other than the module that would have so dramatically influenced their knowledge in making modifications. The significant improvements in test scores shown by the participants after completing the online training module do support the idea that the training module may have played a role in test score improvement.

Self-efficacy

Research Question #2

How does the online training module effect inservice PE teachers' self-efficacy regarding including students with disabilities in team sport activities in the general PE class?

Self-efficacy refers to a situational form of self-confidence. Teachers with higher levels of self-confidence are more likely to fully include students with disabilities in the general PE class (Beamer & Yun, 2014). On this note, the results of this study are encouraging. After participating in the online training module, participants' self-efficacy scores increased 17%. In fact, 24 of the 25 participants showed an increase in self-efficacy, some of which were significant, including those participants with pre self-efficacy scores that were high to begin with and that had extensive APE experience. The only participant that failed to show an increase in self-efficacy scores only spent a total of 21 minutes on the training module, which was not enough time to review all of the information in the training module. The self-efficacy results from this study are similar to those found by Taliaferro and Harris (2014) and mirror those found in a similar study by Kwon and Block (2018). Taliaferro and Harris found that even a one-day workshop on how to include students with autism in PE was enough to significantly increase self-efficacy scores. Present findings support these previous studies and provide further evidence of the potential for online education to improve teacher self-efficacy.

Experience, knowledge, and training have all been found to increase self-efficacy (Hersman & Hodge, 2010; Hutzler et al., 2005). Results of this study support this as a correlation analysis revealed that the number of APE courses a participant had previously taken affected their self-efficacy levels both before and after participating in the training module. Participants that had taken more APE courses in their teacher training programs

had higher levels of self-efficacy both before and after participating in the online training module. What is remarkable about this study was the large change in self-efficacy scores in such a short amount of time. The amount of time spent on the training module ranged from 21 minutes to 390 minutes, with a mean of 92 minutes. Excluding the one participant that spent 390 minutes (which was more than double the amount of time of the next closest participant) the mean amount of time spent on the training module was only 77 minutes. Clearly the online training module was an effective delivery method in providing knowledge, which in turn translated to improved self-efficacy.

Most PE teacher training programs require only one course in APE (Piletic & Davis, 2010). However, the research continues to show that more training and more experience with individuals with disabilities leads to more confident PE teachers (Hersman & Hodge, 2010; Hutzler et al., 2005). It is unlikely that PE teacher training programs will be able to add more APE courses to the curriculum, so it becomes important to find ways to provide key information to inservice PE teachers to make up for information that was not presented during undergraduate training. Results of this study, taken in conjunction with similar studies (e.g., Healy et al., in press, Kwon & Block, 2018) suggest that online training is an effective and efficient way to convey information to inservice PE teachers who do not have the time, funding, or access to attend face-to-face workshops or classes (Block et al., 2016; Healy et al., 2018).

Online Education

Knowles' adult learning theory is based on several assumptions (Knowles 1970). One of the main assumptions is that adults want to be in charge of their own learning. The findings from this study validated that well-established assumption. As part of the

evaluation process on the training module, a series of evaluation questions were posed to participants. One question asked whether the participants preferred how information was presented in Phase 1 (slides that the participants could go through at their own pace), or Phase 2 (video recorded lecture of a professor teaching about the S.T.E.P. model). In keeping in line with the pacing assumption of adult learning theory, 80% of the participants that responded to this question (*n*=16) preferred how the information was presented in Phase 1. That is, they preferred to review the information in slide format which allowed them to control the pace of study, rather than watch the video of somebody presenting the information where they were not in control of the pace. Having control over the pace of learning is one of the main tenets of adult learning theory and an important instructional design strategy to keep in mind for those creating learning opportunities for adults. Future online training modules should continue to reinforce this assumption by developing online education that allows the participants to control the pace of their learning.

Another assumption of adult learning theory is that adults want to learn what is relevant to their lives and important to them at that moment (Knowles, 1970). This assumption is potentially reflected in the demographics of the participants. Many participants had a background in APE, either through schooling or through work experiences, which may have been what interested them in participating in the study. The demographics of the participants in this study do not adequately reflect the demographics of the typical PE teacher that could most benefit from the information in the training module. Research has shown that most PE teachers only receive one APE course during their teacher training (Piletic & Davis, 2010), yet 68% (n=17) of the

participants of this study reported having two or more APE courses. Further, of the 25 participants in this study, 66% (*n*=15) had a Master's degree, and a few of the participants commented that they had specific training in APE either as a teaching minor, or as a Master's degree, neither of which are typical for the majority of PE teachers. While this study does not empirically support adult learning theory (which, as argued previously, is difficult to do as many contend adult learning theory is not, in fact, a theory), it does provide some support to Knowles' assumptions about how adults learn. The fact that 80% of the participants preferred the information that was presented in a form that gave them control over their pace of learning supports Knowles' assumption that adults want to be in control of their learning. This is an important factor to keep in mind when developing online learning for adult populations. Similarly, the overwhelming response of participants with significant APE training and experience supports Knowles' assumption that adults desire to learn what is important and relevant to them. Sadly, the PE teachers that could most benefit from an online training like the one used in this study may not sign up to participate in a study like this because they do not feel that it is relevant to their current situation. Finding a way to get those PE teachers most in need of the training to sign up for and participate in the training is a challenge that researchers face.

The use of Mayer's Cognitive Theory of Multimedia Learning was evident throughout the creation of the training module. As discussed previously, the online training module was guided by Mayer's 12 principles for designing instruction. While not all 12 principles were addressed in the creation of the training module, a few principles were key in designing the instruction. Specifically, the coherence principle

was followed that attempted to reduce extraneous material so as to not overload the learners' cognitive processing ability. The signaling principle was also used to alert the learner to important information and to help the learner organize their thinking. Temporal and spatial contiguity principles were used when deciding where to put words and pictures to maximize the learners' ability to process the information. The essential material was presented in a way to maximize cognitive processing by the use of the segmenting principle and the pre-training principle. The segmenting principle is similar to Knowles' control of pace assumption. The information was presented in small, user-controlled segments. Participants could stop and start whenever they needed to, they could go back and review any previous material, and they controlled how much time was spent processing each slide. Finally, the personalization, voice, and image principles were followed whereby the information was presented in a conversational style as opposed to a formal style, a human voice and not a robot voice was used, and no images of the speaker were used. While no data were collected on the different instructional design principles to validate their use for creating online learning, the positive results from this study lend credence to its use as a framework for creating online learning. This is similar to other studies that have used Mayer's theory as a framework for creating learning while not collecting data on the principles themselves, and which help to demonstrate that effectiveness of the principles in creating online learning (see the work by Kennedy and colleagues for additional information on the use of Mayer's theory with online learning).

Finally, the results from this study provide support to the growing body of research on the use of online education (Means et al., 2014). This is not to say that

similar improvements would not have been found in a face-to-face setting; rather that significant improvements could be made by using an online learning platform to provide additional teacher training. The widespread availability and familiarity with technology make it the ideal medium for teachers to receive additional training that might not otherwise be possible in a face-to-face setting. Online learning has many benefits over face-to-face learning including greater scheduling flexibility and increased learning opportunities, (Healy et al., 2014), and it has also been shown to be as effective as face-to-face learning (Means et al., 2014). Future research could replicate this study while involving a control group that received the same information, but in a face-to-face setting rather than an online setting in order to compare whether or not differences existed in a face-to-face setting compared to an online setting.

Implications and Future Research

The use of online education has been shown to be effective at providing teacher training for inservice teachers (Block et al., 2016), and the results of this study are encouraging in this area. However, research in the field of online education for PE teachers is limited. Thus, more research in this area is warranted. While the use of a control group was initially part of the design of this study, technical issues prevented the use of a control group. Lack of a control group makes it difficult to attribute the differences in pre and post test scores and pre and post self-efficacy scores to the online training module. Future research on the use of online education should include a control group.

Additionally, this study was limited to providing information and strategies for working with individuals with three broad types of disabilities (i.e., intellectual disability,

physical disability, visual impairment). Recommendations and suggestions that are appropriate for one disability, or even for one child with a disability (think about how different two students diagnosed with autism spectrum disorder could be) may not be appropriate for a child with the same disability, or even a similar disability. Thus, future online training modules could provide suggestions and recommendations for other types of disabilities beyond the three used in this study, as well as suggestions and recommendations that cover a wider range of characteristics within the same disability. For example, the description of a student with a physical disability used in this study limited the student to being in a wheelchair with no upper body or cognitive limitations. It is probable that a general PE teacher would have a student with a physical disability in their class that displays physical and cognitive characteristics dissimilar to the ones in the training module. Thus, future research using examples of individuals with disabilities should use a wide range of disabilities, and provide not only a visual representation of the disability, but also a thorough written explanation due to the wide variability that may exists with individuals with the same diagnosis.

This study focused on providing strategies and recommendations for three team sport activities in PE. A well-rounded PE program consists of more than these three activities. It may consist of other team sport activities, individual activities, and/or health-related fitness components. Future online training modules could focus on strategies and recommendations for other team sport activities (e.g., handball, lacrosse) as well as other activities commonly found in the PE setting (e.g., weightlifting, tennis, swimming).

Receiving feedback is an important component of learning. Due to the design of this study, no feedback was presented at any point of the training module to the participants. This lack of feedback may have had an effect on the participants' performance. Because participants received financial compensation only for completing the training module, it is possible that some may have proceeded through the training module as quickly as possible. In fact, 6 of the 25 participants that completed the training module did so in less than 50 minutes. It is difficult to conceive that one could take all of the tests and surveys, view all of the disability information, answer all of the prompts, and view all of the application videos in less than 50 minutes. Therefore, future research should include opportunities for participants to receive feedback throughout the training module. Perhaps a short quiz at the end of each Phase would be appropriate to measure understanding and force participants to go back and revisit and really study material that they may have missed in their first viewing of the material. In addition, these short quizzes at the end of each section could be used to ensure the participants understand the material before moving on to the next topic. For example, an 80% pass rate on a quiz could be used as a trigger to allow participants to move on to the next phase of the module. Participants who failed to score at least 80% on the end-of-Phase quiz would not be allowed to progress until they achieved a score of 80%. Additionally, measures could be put in to place that ensures participants review all of the material before progressing. For example, participants would not be allowed to fast forward or skip videos. When reviewing the information on the slides, a timer could be used so that the participant is required to at least spend a certain amount of time on each slide. While it is possible that

the participant would not be paying attention, at least they would be required to spend a certain amount with the information.

The use of online education is becoming more and more common. There are many benefits to inservice teachers including access to information, cost, and access. In addition, online education has proven to be as effective as traditional methods for dispensing information. But online education is only effective if it is designed appropriately, using proven instructional design methods and strategies. Future research using online education for inservice teachers should look at the different instructional strategies and design methods. For example, data were collected on the amount of time each participant spent on the online training module for 20 of the 25 participants (technical issues prevented data from being gathered for the other five participants). Of the 20 participants that completed the training module, six of them spent less than 50 minutes reviewing the slides, watching the videos and taking the tests. Because of the amount of information in the training module and the number of videos participants were supposed to watch, it is not possible for a person to complete every component of the online training module in less than 50 minutes. Failure to properly review all of the information in the training module would surely affect posttest scores. Thus, future studies could look at ways of requiring participants to view each component of the training module or spend a specific amount of time reviewing the information.

Future studies could also examine the use of videos as an instructional strategy. Do participants learn more when the information is presented in video format as compared to text? Does the length of the video segments affect participants' viewing habits? Because the online training module was designed to allow participants to review

it at their own pace, it was possible for participants to skip watching some of the videos. Making the viewing of the videos mandatory, or requiring some sort of post-video evaluation (such as a quiz on the contents of the video), may improve the effectiveness of the online training module. Future studies could give one group information in video format and the other group information in video format. Participants from each group could be compared in their pre and post test scores to see if one format was superior to another format for learning.

Most PE teachers only receive one APE course during their teacher training. This training was designed to provide additional support for these inservice PE teachers. However, recruiting inservice PE teachers with limited APE experience was difficult using the recruitment methods that were employed during this study. Because of this, most of the participants were not representative of the general PE teaching population. In order to target PE teachers with limited training in APE, different recruitment methods are required. Along these lines, while 51 participants ultimately expressed interest in participating, only 25 completed the study. Low completion rates are common in online education, so something must be done to encourage those who begin the study to ultimately complete it. A $20-25 gift card was provided to those who completed the training module, but maybe that was not enough to entice inservice PE teachers. Additionally, one of Knowles' adult learning theory assumptions is that adults want to learn what is important and relevant in their lives. Thus, it becomes necessary to target inservice PE teachers that are currently teaching team sport activities to individuals with ID, PD, and VI. Those PE teachers may be more interested in the training module

because they view the contents as something that could immediately help them in their daily teaching.

Finally, this study was limited in the amount of information that could be presented and the mean amount of time spent on the training module was only 77 minutes. It is difficult to believe that 77 minutes of additional training is sufficient to significantly affect teacher knowledge or behavior. While the results of this study show that participants improved in content knowledge and self-efficacy after participating in this online training module, future research could aim to discover how much time is needed for significant changes in knowledge and behavior to take effect.

Conclusion

The number of students with disabilities participating in the general PE setting is not likely to decrease anytime soon. At the same time, the amount of training that PE teachers receive on how to work with individuals with disabilities in PE is also not likely to change. Because the amount of training PE teachers currently receive is not adequate, and because it is difficult for inservice PE teachers to obtain additional training through schooling, the use of online education has the potential to provide a way for inservice PE teachers to receive additional training on including students with disabilities in PE. Similar to recent studies on this subject, the results of this study provide encouraging support to the idea that online education, when designed appropriately, may provide an acceptable method for inservice PE teachers to participate in additional training which may improve their knowledge and self-efficacy regarding the inclusion of students with disabilities in the general PE setting.

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APPENDICES

Appendix A

IRB Approval

In reply, please refer to: Project # 2018-0456-00

November 9, 2018

Chad Nichols and Martin Block
Kinesiology
210 Emmet St., South
Mem Gym 203
Charlottesville, VA 22903

Dear Chad Nichols and Martin Block:

The Institutional Review Board for the Social and Behavioral Sciences has approved your research project entitled "The use of online learning to increase teacher self-efficacy for including students with disabilities in PE." You may proceed with this study. Please use the enclosed Consent Form(s) as the master for copying forms for participants.

Research was expedited under the following category:

7-Research on individual or group characteristics or behavior

This project # 2018-0456-00 has been approved for the period November 8, 2018 to November 7, 2019. If the study continues beyond the approval period, you will need to submit a continuation request to the Review Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Science

Appendix B

Demographic questions

1. What is your age?
    - 21-30
    - 31-40
    - 41-50
    - 50+

2. What is your gender?
    - M
    - F
    - Prefer not to answer

3. What is your highest level of education
    - High school
    - Bachelor's
    - Master's
    - Ph.D

4. Number of APE classes taken
    - 0
    - 1
    - 2
    - 3
    - 4+

5. Do you have a PE teaching license?
    - Yes
    - No

6. PE teaching experience
    - First year
    - 1-5 years
    - 6-10 years
    - 11-20 years
    - 20+ years

7. What are your experiences with students with intellectual disabilities in physical education or community sports?
    - No experience
    - Once or twice
    - Several times

8. What are your experiences with students with physical disabilities in physical education or community sports?
    - No experience
    - Once or twice
    - Several times

9. What are your experiences with students with visual disabilities in physical education or community sports?
    - No experience
    - Once or twice
    - Several times

Appendix C

Grading Rubric

Criteria	Exemplary (3pts)	Proficient (2pts)	Developing (1pt)	Unacceptable (0pts)
# of S.T.E.P. modifications	Provides at least 2 appropriate modifications for each component of the S.T.E.P. model	Provides at least 1 appropriate modification for each component of the S.T.E.P. model	Provides at least 2 appropriate modifications, but not for each component of the S.T.E.P. model	Provides fewer than 2 appropriate modifications
Appropriateness of modification to disability	Each modification is appropriate	The majority of the modifications are appropriate	The majority of the modifications are not appropriate	Modifications are not appropriate for the disability
Appropriateness of modifications to activity	Each modification is appropriate	The majority of the modifications are appropriate	The majority of the modifications are not appropriate	Modifications are not appropriate for the activity
Total score:				

Appendix D

Table of Specifications

In order to measure an increase in teacher knowledge, a 25-question test was created by the researcher based on the content in the online training module. The purpose of this training module is to (1) provide basic information about characteristics and limitations of three common disabilities found in the general PE setting, (2) introduce the S.T.E.P. model for making accommodations to PE activities, and (3) appropriately using the S.T.E.P. model to make accommodations to PE activities according to the student's disability. Each of those purposes receives 1 phase of the 3-phase training module, but knowing the different components of the S.T.E.P. model is rather insignificant; it is more important that the learner understands the application of the S.T.E.P. model.

Disability questions. Three disabilities are covered in the training module during Phase 1. Intellectual disability takes up 60% of the slides (27 slides) and physical disability and visual impairment each taking up 20% (9 slides). The test has 10 questions related to intellectual disability, six for physical disability and seven for visual impairment.

Disability	Test Question	Total
Intellectual Disability	1,2,6,7,9,10,13,15,18,24	10
Physical Disability	3,5,17,19,22,23	6
Visual Impairment	4,8,12,16,20,21,25	7

2 test questions are not related to any disability, which is why the total =23

S.T.E.P. questions. Each letter of the S.T.E.P. model receives equal weight in the training module. For the test, there are three questions about Space, four questions about Task, two questions about Equipment and 3 questions about People. Equipment only has

two questions because it was incredibly difficult to write a question about equipment for an individual with a visual impairment where the answer was not obvious.

S.T.E.P.	Test Question	Total
Space	15,16,17	3
Task	14,18,19,20	4
Equipment	21,22	2
People	23,24,25	3

The first 13 questions did not address the S.T.E.P. model

PHASES. The online training module consists of three phases. Phase 1 provides details about each of the disabilities. Phase 2 introduces the S.T.E.P. model for making modifications to team sport activities. Phase 3 provides the application of the disability with the S.T.E.P. model. The two main purposes of the training module are to provide basic information about disabilities, and teach PE teachers how to modify team sports to include students with disabilities. 13 of the test questions deal with information about the disabilities, and 12 questions deal with information about the S.T.E.P. model.

Phase	**Test question**	**Total**
Phase 1	1,2,3,4,5,6,7,8,9,10,11,12,13	13
Phase 2	14,15,16,17,18,19,20,21,22,23,24,25	12
Phase 3	15,16,17,18,19,20,21,22,23,24,25	11

Some questions address more than one phase, which is why the answer = more than 25

Knowledge vs. Application. Six questions are strictly knowledge questions while 19 questions deal with the application of knowledge. Some of the questions are about the application of knowledge toward a disability, while most of the application questions require the learner to understand the characteristics of a disability and how those characteristics interact with the different components of the S.T.E.P. model.

	Knowledge	Application
Test Question	1,2,3,4,5,6,	7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25
Total	6	19

Appendix E

Knowledge Test Questions

1. Intellectual disability is characterized by limitations in what 2 areas?
    a. Social-emotional intelligence and verbal reasoning
    b. Intellectual functioning and adaptive behaviors
    c. Adaptive behaviors and social-emotional intelligence
    d. Verbal reasoning and intellectual functioning

2. Which of the following statements **is not true** regarding Intellectual disability?
    a. An intellectual disability is a mental disorder
    b. An intellectual disability is classified in part as having an IQ below 70
    c. An intellectual disability occurs before age 18
    d. Down syndrome is an example of an intellectual disability

3. What population group incurs the most spinal cord injuries (SCI)?
    a. Females between the ages of 15-35
    b. Males between the ages of 15-35
    c. Females between the ages of 36-55
    d. Males between the ages of 36-55

4. Legally blind is considered?
    a. 20/100 with corrective lenses
    b. 20/100 without corrective lenses
    c. 20/200 with corrective lenses
    d. 20/200 without corrective lenses

5. Which of the following spinal cord injury descriptions would be classified as "functional"?
    a. Complete/incomplete
    b. C-4
    c. Quadriplegia
    d. Sacral lesion

6. This affects approximately 40-50% of individuals with Down syndrome?
    a. Cardiac problems
    b. Cleft palate
    c. Motor delays
    d. Hypotonia

7. Which of the following activities would not be recommended for someone with Atlanto-Axial Instability (AAI)?
    a. Volleyball
    b. Tumbling
    c. Swimming

d. Flag football

8. Individuals with visual impairments may struggle in social situations because:
   a. They prefer to be by themselves
   b. They don't want people to know they have a disability
   c. They lack the self-confidence to initiate conversations
   d. They have a difficult time maintaining eye contact

9. When doing stretching exercises with individuals with this condition, the teacher must be careful not to overstretch.
   a. Phenylketonueria (PKU)
   b. Atlanto Axial Instability
   c. Spinal Cord Injury
   d. Hypotonia

10. Allowing choice in things such as choosing equipment color, or selecting a partner would be appropriate for children with this disability?
    a. Intellectual disability
    b. Physical disability
    c. Visual impairment
    d. This is not an appropriate modification

11. Providing detailed, written instructions would be an appropriate modification for children with this disability?
    a. Intellectual disability
    b. Physical disability
    c. Visual impairment
    d. This is not an appropriate modification for children with these disabilities

12. Providing clear, explicit, detailed, verbal instructions would be an appropriate modification for children with this disability?
    a. Intellectual disability
    b. Physical disability
    c. Visual impairment
    d. This is an appropriate modification for all of the disabilities

13. Providing visual aids and demonstrations when explaining an activity would be the **most** appropriate modification for children with this disability?
    a. Intellectual disability
    b. Physical disability
    c. Visual impairment
    d. This is an appropriate modification for all of the disabilities

14. According to the S.T.E.P. model, giving students one point if they shoot the ball and it hits the backboard, 2 points if they hit the rim/net, and 3 points if they make a basket is an example of what type of modification?

a. Space
b. Task
c. Equipment
d. People

15. Which *Space* modification would be ***most*** appropriate for a student with an intellectual disability that can't serve the ball over the net.
    a. Provide the student with a lighter ball
    b. Lower the net
    c. Allow the student to serve from a closer distance
    d. Allow the student to throw the ball over the net rather than hit it

16. Which *Space* modification would be ***most*** appropriate for a student with a visual impairment in basketball?
    a. Having another player tap the rim to make noise so the student knows where to shoot the ball
    b. Restricting the player to only an offensive or defensive position so they don't have to run up and down the court.
    c. Assigning a peer buddy to stand next to the student and explain what is going on and to protect them from injury
    d. Using a basketball that makes noise

17. Which *Space* modification would be ***most*** appropriate for a student with a spinal cord injury in soccer?
    a. Limiting how many times a player can dribble before having to pass the ball to a teammate
    b. Making the goals larger so it is easier to kick the ball in the net
    c. Assigning players specific positions in the field and requiring that they stay in these positions
    d. Assigning a peer buddy to push the student's wheelchair

18. Which *Task* modification would be ***most*** appropriate for a student with an intellectual disability in soccer?
    a. Assigning a peer buddy to assist the student and make sure they follow the rules
    b. Having a rule that no student may steal the ball from any other student
    c. Playing 5v5 on a half field instead of 11v11 on a full field
    d. Assigning each player a position and requiring that they stay in their area

19. Which *Task* modification would be ***most*** appropriate for a student with a spinal cord injury in basketball?
    a. Use an 8 ft. basket instead of a 10 ft. basket
    b. Place an opposing student in a wheelchair and require the two students guard each other
    c. Reward points for making a basket or hitting the rim, backboard, or net
    d. Requiring the student in a wheelchair to only play offense so he will not tire going up and down the court

20. Which *Task* modification would be ***most*** appropriate for a student with a visual impairment in volleyball?
    a. Allowing a teammate to catch the ball for the student and then gently toss it to them so they can hit it over the net
    b. Allowing them to serve the ball by throwing it over the net instead of hitting it
    c. Allowing the ball to bounce once before it must be hit
    d. Allowing the student to hit the ball over however they would like (no rules like lift, or double contact)

21. Which *Equipment* modification would be ***most*** appropriate for a student with a visual impairment in soccer?
    a. A ball that makes noise
    b. A large, slow-moving, colorful ball (like a beach ball)
    c. Having a peer stand behind the goal and clap hands
    d. A soccer trainer net tied around the ankle that keeps the ball from getting away when the student kicks it

22. Which *Equipment* modification would be ***most*** appropriate for a student with a physical disability in volleyball?
    a. A ball that makes noise
    b. A large, slow-moving ball (like a beach ball)
    c. Placing all students in a wheelchair to level the playing field
    d. Lowering the net

23. Which *People* modification would be ***most*** appropriate for a student with paraplegia in basketball?
    a. Assigning a player on the other team to also be in a wheelchair
    b. Have everybody play on an 8-ft. hoop instead of a 10-ft. hoop
    c. Assigning a peer buddy to push the student's wheelchair
    d. Prohibit opposing players from stealing the ball or blocking their shot

24. Which *People* modification would be ***most*** appropriate for a student with an intellectual disability who has eye-hand coordination problems when playing volleyball?
    a. Assigning a peer buddy to stand by the student and provide instruction and feedback
    b. Allowing the student to play as a 7^{th} player (volleyball is played 6v6)
    c. Assigning a peer buddy to catch the ball and then gently toss it to the student
    d. Playing 4v4 instead of 6v6

25. Which *People* modification would be ***most*** appropriate for a student with a visual impairment in soccer?
    a. Assigning a peer buddy to stand by the student and verbally describe what is happening
    b. Placing a blindfold around a player on the opposing team so the teams are even

c. Assigning a peer buddy to help control the ball and ensure it is kicked in the right direction
d. Playing 5v5 instead of 11v11to limit the number of people on the field

Appendix F

Self-Efficacy Survey

Situational-Specific Self-Efficacy and Inclusion Students with Disabilities in Physical Education

Directions: This survey is designed to investigate your self-efficacy towards including a student with an intellectual, physical, or visual disability into your high school general physical education program. We define self-efficacy as your personal judgment of your competence or your confidence in your ability to carry out a goal or task (Bandura, 1986). In this case, we want to find your personal judgment of how confident you are in your ability to accommodate a student with an intellectual, physical, or visual disability who is included in your general physical education classes. The competency scale for each question is from 1 (no confidence) to 5 (complete confidence). There are no right or wrong answers, and every physical educator will answer these questions differently. We only want to find out how confident you feel in your ability to accommodate a student with an intellectual, physical, or visual disability like the ones described below into your general physical education class. The survey ends with some demographic questions. We are not asking for your name or any identifying information, so your participation is completely anonymous.

Part 1 – Intellectual Disability

Below you will see a description of a student with an intellectual disability. This will be followed by a series of questions about how competent/capable you feel about making certain accommodations for this student. You will then see a description of a student with a physical disability followed by another series of questions. Answer these questions

as if this student is going to be in your general physical education class next week. The competency scale for each question is from 1 (cannot do at all) to 5 (highly certain can do).

****

Description of Student with an Intellectual Disability

Noah is a high school student with an intellectual disability, so he doesn't learn as quickly as his classmates. Because of his intellectual disability he also doesn't talk very well, so sometimes it is hard to understand what he is saying. However, he will point or gesture to help people know what he wants. He also has trouble understanding verbal directions, particularly when the directions have multiple steps. Noah likes playing the same sports as his classmates, but he does not do very well when playing actual games. Even though he can run, he is slower than his peers and tires easily. He can throw, but not very far, and he can catch balls that are tossed directly to him. He likes soccer, but he cannot kick a ball very far, and he never can remember where to go on the field. He also likes basketball, but he does not have enough skill to dribble without losing the ball, and he is not coordinated enough to make a basket. He also does not really know the rules for basketball or other team sports, and he easily gets distracted and off task during the game.

****

Questions a-c: You are conducting physical fitness testing with your 9th grade physical education class of 30 students that includes Noah.

Please rate **how certain you are that you can do the things listed below** by writing the appropriate number from 1-5 using the scale given below after each question.

1	2	3	4	5
No Confidence	Low Confidence	Moderate Confidence	High Confidence	Complete Confidence

a. How confident are you in your ability to **keep Noah on task** during fitness testing?

b. How confident are you in your ability to **modify the test** for Noah?

c. How confident are you in your ability to **instruct peers to help Noah** during fitness testing?

Questions d-h: You are conducting a team sport unit such as volleyball, basketball, or soccer to your 9th grade physical education class of 30 students that includes Noah. You are in the first week of the unit, and you are teaching the basic skills of the sport (ex, the bump, set, and serve in volleyball).

d. How confident are you in your ability to **modify your instructions to help Noah understand what to do** when teaching sport skills?

e. How confident are you in your ability to help Noah **stay on task** when teaching sport skills?

f. How confident are you in your ability to **modify equipment** to help Noah when teaching sport skills?

g. How confident are you in your ability to **modify the actual skills** to help Noah when teaching sport skills?

h. How confident are you in your ability to **instruct peers to help Noah** when teaching sport skills?

Questions i-k: You are conducting a team sport unit such as volleyball, basketball, or soccer to your 9th grade physical education class of 30 students that includes Noah. You

are in the last week of the unit, and you are now having your students play the actual game.

i. How confident are you in your ability to **modify rules of the game** for Noah?

j. How confident are you in your ability to help Noah **stay on task** during the game?

k. How confident are you in your ability to **instruct peers to help Noah** during the game?

Situational-Specific Self-Efficacy and Inclusion Students with Disabilities in Physical Education

Part 2 – Physical Disability

Below you will see a description of a student with a physical disability. This will be followed by a series of questions about how competent/capable you feel about making certain accommodations for this student. As was the case above, answer these questions as if this student is going to be in your general physical education class next week. The competency scale for each question is from 1 (cannot do at all) to 5 (highly certain can do).

****

Description of a Student with a Physical Disability

Ashton is a high school student with a spinal cord injury. He cannot walk, so instead he pushes himself in his wheelchair to get around. Ashton likes playing the same sports as his classmates, but he does not do very well when playing the actual game. Even though he can push his wheelchair, he is slower than others and tires after pushing his chair for only 1-2 minutes. He can pass and serve a volleyball, but not far enough to get it over

the net. He can catch balls tossed straight to him. However, he does not have the upper body strength to shoot a basketball high enough to make a regulation basket. Because he cannot use his legs, he cannot kick a soccer ball, but he can push the ball forward with his chair.

****

Questions a-d: You are conducting physical fitness testing with your 9th grade physical education class of 30 students that includes Ashton.

Please rate **how certain you are that you can do the things listed below** by writing the appropriate number from 1-5 using the scale given below after each question.				
1	**2**	**3**	**4**	**5**
No Confidence	**Low Confidence**	**Moderate Confidence**	**High Confidence**	**Complete Confidence**

a. How confident are you in your ability to **create individual goals for Ashton** during fitness testing?

b. How confident are you in your ability to **modify the test** for Ashton?

c. How confident are you in your ability to **instruct peers to help Ashton** during fitness testing?

d. How confident are you in your ability to **make the environment safe** for Ashton during fitness testing?

Questions e-h: You are conducting a team sport unit such as volleyball, basketball, or soccer to your 9th grade physical education class of 30 students that includes Ashton. You are in the first week of the unit, and you are teaching the basic skills of the sport (ex, the bump, set, and serve in volleyball.

e. How confident are you in your ability to **make modifications to sports skills** if Ashton cannot perform like his peers when you are teaching sport skills?

f. How confident are you in your ability to **make the environment safe** for Ashton when teaching sport skills?

g. How confident are you in your ability to **modify equipment** to help Ashton when teaching sport skills?

h. How confident are you in your ability to **instruct peers to help Ashton** when teaching sport skills?

Questions i-l: You are conducting a team sport unit such as volleyball, basketball, or soccer to your 9th grade physical education class of 30 students that includes Ashton. You are in the last week of the unit, and you are now having your students play the actual game.

i. How confident are you in your ability to **modify rules of the game** for Ashton?

j. How confident are you in your ability to **modify equipment** to help Ashton during the game?

k. How confident are you in your ability to **make the environment safe** for Ashton during the game?

l. How confident are you in your ability to **instruct peers to help Ashton** when teaching sport skills?

Situational-Specific Self-Efficacy and Inclusion Students with Disabilities in Physical Education

Part 3 – Visual Disability

Below you will see a description of a student with a visual disability. This will be followed by a series of questions about how competent/capable you feel about making certain accommodations for this student. As was the case above, answer these questions as if this student is going to be in your general physical education class next week. The competency scale for each question is from 1 (cannot do at all) to 5 (highly certain can do).

****

Description of a Student with a Visual Disability

Sofia is a high school student. She has severe visual impairment, so she can only see people and objects when they are really close to her. She likes physical activity, and her fitness level is comparable to her peers. She needs physical assistance to safely move around physical education settings. For example, she holds onto a peer's elbow and listens to her peer's auditory cues when she does the mile run. Also, her vision is not good enough to see demonstrations, so she needs verbal instructions and someone guiding her through the movement to understand how to perform a skill. When playing a team sport (e.g., basketball, volleyball, soccer), she needs someone with her for safety and to make sure she knows where she is on the field, and she needs a ball with auditory cues to know where the ball is during the game. Regarding her skill level, she cannot catch a ball, but she can throw or kick the ball towards an auditory target.

****

Questions a-c: You are conducting physical fitness testing with your 9th grade physical education class of 30 students that includes Sofia.

Please rate **how certain you are that you can do the things listed below** by writing the appropriate number from 1-5 using the scale given below after each question.				
1	**2**	**3**	**4**	**5**
No Confidence	**Low Confidence**	**Moderate Confidence**	**High Confidence**	**Complete Confidence**

a. How confident are you in your ability to **make the environment safe for Sofia** during fitness testing?

b. How confident are you in your ability to **instruct peers to help** Sofia during fitness testing?

c. How confident are you in your ability to **modify the fitness testing requirements for Sofia** during fitness testing?

Questions d-g: You are conducting a team sport unit such as volleyball, basketball, or soccer to your 9th grade physical education class of 30 students that includes Sofia. You are in the first week of the unit, and you are teaching the basic skills of the sport (ex, the bump, set, and serve in volleyball.

d. How confident are you in your ability to **modify instructions** to help Sofia when teaching sport skills?

e. How confident are you in your ability to **instruct peers to help Sofia** when teaching sport skills?

f. How confident are you in your ability to **modify equipment** to help Sofia when teaching sport skills?

g. How confident are you in your ability to **make the environment safe for Sofia** during fitness testing?

Questions g-i: You are conducting a team sport unit such as volleyball, basketball, or soccer to your 9th grade physical education class of 30 students that includes Sofia. You

are in the last week of the unit, and you are now having your students play the actual game.

g. How confident are you in your ability to **make the environment safe** for Sofia during the game?

h. How confident are you in your ability to **instruct peers to help Sofia** during the game?

i. How confident are you in your ability to **modify rules of the game** for Sofia?

Appendix G

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Appendix H

Instructional Design Document

Instructional Problem

One course in adapted physical education (PE) is often all that is offered to students in Physical Education Teacher Education (PETE) programs. At times this course is an elective, thus decreasing the number of PE teachers that receive training in including students with disabilities in physical education. Once those teachers get in the field they quickly realize that a decent percentage of their students have a disability and that they are not adequately prepared to include them in class. In some states, the physical education teacher is not even required to be licensed to teach PE. They may be licensed to teach another subject, or they may not have any PE training at all.

The teachers that would be interested in this online training module fall into three categories. The first group are those teachers that are dedicated to their work, seek to constantly improve and do not feel they were adequately prepared for their job. They would be practicing PE teachers with limited financial resources and limited time. They would be highly motivated to learn. The second group consists of those practicing PE teachers who need professional development to keep their license, but that do not care how they get credit. Professional development is just a box for them to check to keep their job. They are not willing to put in the extra effort required to be a great teacher and are content to continue doing what they have always done. The third group of teachers are those that are not qualified to be PE teachers but find themselves teaching PE. They have students with disabilities in their class yet they do not know what to do with them. Because of their lack of PE teacher training they are just trying to make it through

the day. They are looking for anything that they can do for those students with disabilities in their classroom. They may be motivated, but they lack the knowledge and skills to truly make an impact.

The online training module will teach PE teachers how to include students with disabilities (specifically intellectual disabilities, physical disabilities, visual impairments, but most concepts apply to other types of disabilities as well) in team sport activities (specifically basketball, soccer, volleyball, but most concepts will apply to other sports as well). It will show them how to modify equipment, rules, and games so that students with disabilities can be successful. It will mostly be geared toward the junior high and high school aged students because that is the age when students should be playing these activities in PE.

In order for the PE teacher to get the most out of this training module they need to be actively teaching secondary PE in a school that has students with disabilities included in the general curriculum. They must be motivated to learn and they must have the desire to make their PE class as beneficial for the students with disabilities as for those without disabilities.

Learner and Context

PE teachers do not feel adequately prepared to include students with disabilities in their physical education classes (Block, Kwon, & Healy, 2016). Through my work I hope to provide these practicing PE teachers with the knowledge and skills to successfully modify team sport activities so students with disabilities can participate.

From personal experience as a PE teacher and district PE specialist, and as a supervisor of student teachers in PE, I have seen how PE teachers do not adequately

include students with disabilities in PE. Additionally, research shows that PE teachers do not feel they were adequately trained to include students with disabilities in PE (Hill & Brodin, 2004). Lastly, interviews with an expert in the field of adapted PE, and inclusion in particular, has further exposed the need for additional training for PE teachers on the process of inclusion.

The targeted population are inservice PE teachers. Because PE teachers are found throughout not only the country, but also the world, the targeted population is geographically dispersed. The age range for most PE teachers is between 21-65. The work experience varies widely from those recently hired for their first teacher job to those with decades of teaching experience. The experience working with students with disabilities of these inservice PE teachers will also vary significantly. Some of these teachers may have experience in online education while others may not.

Specific entry characteristics. Inservice PE teachers will know how to plan appropriate PE lessons. Because this is an online training module, teachers must have a basic understanding of how to use computers.

Academic information. Inservice PE teachers should have at least a Bachelor's degree. The majority of these degrees will be in PE, but some may be in fields related to PE. It is also possible for some PE teachers to have a Bachelor's degree in a field unrelated to PE. Some states required PE teachers to be licensed to teach PE, while other states only mandate that their PE teachers be licensed to teach, regardless of the subject. Some of these inservice PE teachers may also have a Master's degree.

Personal and social characteristics. From personal experience, PE teachers are very enthusiastic about PE. They enjoy being active themselves and pass that enthusiasm

on to their students. Many times, these PE teachers are also employed as coaches for local sports teams. I have noticed that some PE teachers are very receptive to inclusion whereas other teachers do not wish to have students with disabilities in their classrooms. Because of the responsibilities of the job, there are not many PE teachers with disabilities.

Task Analysis

Identify an aim. The aim of my instructional intervention will be to provide an easy-access training module that provides ready-to-implement techniques and strategies so inservice PE teachers have the skills and confidence to include students with disabilities in team sport activities in the general PE setting.

Goal statement. Learners will gain knowledge and skills to successfully plan and adapt a PE class so students with disabilities can be included successfully in team sport activities.

Learning Objectives

Objective #1

Goal	Know characteristics and limitations of three disabilities commonly found in PE
Objective	Understand three disabilities and how those abilities affect a student's ability to participate in the general PE class

Objective #2

Goal	Know S.T.E.P. model for making accommodations in PE
Objective	Know what each letter of the S.T.E.P. model is and how it can be used to modify PE activities

Objective #3

Goal	Be able to apply the S.T.E.P. model to a team sport activity for each of the three disabilities

Objective	While watching a video example of a student with a disability in a PE class, the learner will correctly identify the appropriate modifications based on the S.T.E.P. model to use in each situation

Objective #4

Goal	Develop the confidence to willingly include students with disabilities in your PE class and to teach and reflect on lessons that accommodate their needs

Task Analysis and Content Sequencing

To create my online training module, I will be using Articulate 360. Articulate 360 is a professional-grade software program used for designing e-learning courses. Articulate 360 is similar in design and function to Powerpoint, but significantly more powerful and capable. Once the training module is created in Articulate 360 I will host it on the University's Learning Management System (i.e., Canvas) so that it is easily accessible for my learners. Due to the characteristics of my learners (geographically dispersed, working professionals) a self-paced, asynchronous design is appropriate. Learners will have three weeks to complete the training. The training module will consist of a pre and post knowledge test and a pre and post self-efficacy survey. The training is presented in three phases. Before beginning phase 1 the learners will take a knowledge test on disability characteristics and modifications. They will also complete a self-efficacy survey to see if, after participating in the training, they feel more confident in their ability to include students with disabilities in team sport activities in the general PE setting.

In Phase 1 of the training module the learners are introduced to the characteristics and limitations of three common disabilities (i.e., intellectual disabilities, physical disabilities, and visual impairment). Suggestions will be provided on appropriate teaching strategies for students with these disabilities in the PE setting.

In Phase 2 the learners will be presented with the S.T.E.P. model for making modifications in PE. The learners will become familiar with this model by watching a lecture given by an adapted PE professor. The learners will then have the opportunity to make modifications to certain PE activities (i.e., basketball, soccer volleyball) using the S.T.E.P. model that they learned about. They will be able to compare their choices to the correct choices of an expert, thus allowing the learner to measure their own learning.

In Phase 3 the learner will combine the disabilities from Phase 1 with the modifications from Phase 2 to appropriately modify PE activities based on a particular disability. Learners will watch a video of a student with a disability participating in a team sport activity in PE. The different components of the S.T.E.P. model will be presented. After watching the different components of the S.T.E.P. model being used in a team sport activity (i.e., volleyball), the learner will then watch a video of a class playing that team sport activity. The learner will have to identify the modifications that were used in the video for the students with disabilities. This process will be repeated for another team sport activity (i.e., basketball). Finally, the learner will have the opportunity to modify the game of soccer using the S.T.E.P. model for students with each of the three disabilities.

Once the learner has completed all three phases of the training module they will once again take the knowledge test and the self-efficacy survey. In order to accomplish the goals of increasing knowledge and self-efficacy, the following instructional strategies will be used:

Instructional Strategies

Objective	**Type of Content**	**Name of Strategy**	**How Strategy will be Used**

1. *Know characteristics and limitations of three disabilities (i.e., intellectual, physical, visual)*	Facts	Explanatory text Case study	Initial Presentation Learners will read a case study about an individual with a disability. This case study will describe the individual's cognitive and physical capabilities and limitations.
2. *Know S.T.E.P. model for making accommodations in PE*	Concept	Video lecture	Initial Presentation First, the learners will watch a videotaped lecture that will introduce the learners to the STEP model for making modifications for students with disabilities in PE.
3. *While watching a video example of a student with a disability in a PE class, the learner will correctly select the appropriate modifications based on the STEP model to use in each situation*	Principles and Rules	Video clip Scenarios If/Then Compare/Contrast Practice	Initial/Generative Learners will be shown a short video clip of a student with a disability in the gymnasium at the beginning of an activity in basketball, volleyball or soccer. The learner must select an appropriate instructional strategy to accommodate the student for that particular activity. The learner will then compare his modifications to the expert's modifications. Numerous clips will be shown with different disabilities and different activities.
4. *Feel confident in making modifications for all learners in PE class*	Procedure	Authentic context Practice	

Designing the message

Technology Choice & Rationale for use of Articulate 360 to create content	
Requirements	**Best-Fitting Technology & Rationale**
Learner Characteristic: Learners range in age from 21-65. Knowledge and skill use of computers is varied. Technology must be simple enough for a beginner to navigate Contextual Characteristic: Learners are geographically dispersed throughout the country. They must have access to a computer, internet access, and the capability to watch videos (with sound) on their computer. Instructional Strategy selected: Because this instruction is geared toward a geographically dispersed population of PE teachers, it is best distributed in a way that can be accessed from anywhere at any time. Therefore, an asynchronous, online delivery method is the preferred choice of distribution. The learners would be able to access the content at their convenience, proceed at their own pace, and revisit the information as often as they would like. Articulate 360 is professional quality, industry standard for e-learning courses. To reduce the cognitive load, the interface must be user-friendly. Readable sized text, consistent word usage, easy to navigate screens, return button.	Articulate 360: is a software program for designing e-learning courses Rationale for Selection: • Customizable for the instructor • Professional quality • UDL compliant • Capable of both simple and advanced presentation techniques • Can store videos, pictures, audio, text • Learners can access content without signing up for account

Technology Choice & Rationale for use of LMS to host content	
Requirements	**Best-Fitting Technology & Rationale**
Learner Characteristic: Learners range in age from 21-65. Knowledge and skill use of computers is	Canvas: Canvas is a learning management system (LMS)

varied. Technology must be simple enough for a beginner to navigate Contextual Characteristic: Learners are geographically dispersed (possibly outside of country). They must have access to a computer, internet access, and the capability to watch videos (with sound) on their computer. Instructional Strategy selected: Because this instruction is geared toward a geographically dispersed population of physical education teachers, it is best distributed in a way that can be accessed from anywhere at any time. Therefore, an asynchronous, online delivery method is the preferred choice of distribution. The learners would be able to access the content at their convenience, proceed at their own pace, and revisit the information as often as they would like. An online delivery platform (like Collab/Blackboard) is the preferred method. These online delivery platforms are known as learning management systems (LMS). To reduce the cognitive load, the interface must be user-friendly. Readable sized text, consistent word usage, easy to navigate screens, return button.	designed specifically for education that can be used by both the learner and the instructor. The LMS will be the learning platform for the entire online training module. Rationale for Selection: • Customizable for the instructor • Gated modules that require the completion of module before advancing to the next module • Can store videos • Two-way access to share assignments and receive feedback • The Canvas interface is easy to understand and similar to other LMS learners may be familiar with • Learners can access content without signing up for account • Storage space large enough to store training module • Can track learner data

Development of the instruction

Instruction item	Medium	Description and Purpose	Objective
Case studies	Essay response	Half page written text detailing a PE scenario. There will be one case study for each of the three disabilities. Each case study will describe limitations and characteristics of the disability	1
Modifications	Videotaped lecture	Lecture will highlight key components of STEP model and provide examples of how they can be used in PE	2

Video clips	Video clips	Short video clips of regular PE situations. Narrator explains the scenario. Video stops so learner can record response. Video resumes (on learner's command) to show appropriate modifications by expert teacher.	3

Evaluation instruments

One of the purposes of assessment is to determine the effectiveness of the instruction. Assessment is key to knowing whether or not the intervention accomplished what it was designed for. Proper assessment consists of both formative and summative assessments. Formative assessments occur during the creation process and guide how the intervention is created while summative assessment comes at the end and provides details about what was learned during the intervention. It does not guide the creation process, but rather provides information at the conclusion of the process. Both types of assessment are important.

There are multiple opportunities for summative evaluation in the training module. Learners will read a case study and respond to a scenario involving a student with a disability in PE. Learners will also identify, from a video, the modifications made during a team sport activity for a student with a disability. Additionally, learners will use the S.T.E.P. model to show how to make accommodations for each of the three disabilities for a team sport activity not shown in the videos. Lastly, at the conclusion of the training module learners will have the opportunity to answer questions about the entire training module. Each of these assessments will provide summative information regarding the different components of the training module.

The online training module will also undergo a 3-step formative evaluation based on Tessmer's formative evaluation model (1995). This formative evaluation plan is explained in detail in the method section.

Appendix I

Formative Evaluation Protocol: Expert Review

	The purpose of this online training module is to provide general physical education (GPE) teachers with the knowledge and skills to confidently and competently include students with disabilities in physical education activities. Specifically, this training module will provide information about intellectual disabilities, physical disabilities, and visual impairments and the modifications that can be made for those disabilities in the activities of basketball, soccer and volleyball.
Why	The purpose of this formative evaluation plan is to identify strengths and weaknesses of the training module, gauge its effectiveness in providing the appropriate content, and determine if the instructional strategies lead to student learning.
What	For this formative evaluation you will review the online training module and answer the following questionnaire about your experience. Please use your expertise (instructional design or APE) to critique the online training module for content accuracy, effectiveness of content delivery methods, and efficiency in instructional design and strategy. You will provide feedback on the overall effectiveness of the design, the color scheme and formatting of each slide, the appropriate use of instructional strategies and the flow of the training module. If you would like, you may also video record your screen as your review the online training module and comment about what you see and what you are experiencing. This video analysis will provide another source of feedback for me.
Where	You have 2 weeks to complete your review. You do not have to do the entire review at one time (in fact, I encourage you to space it out over multiple days). You can work from your own computer, at home, at the office, essentially anywhere you have access to a computer with Internet.

Expert Review Questionnaire

Is content complete?	
Is content accurate?	
Is the instructional strategy appropriate in phase 1?	
Is the instructional strategy appropriate in phase 2?	
Is the instructional strategy appropriate in phase 3?	
Is the instructional strategy appropriate in phase 4?	
Does the overall design align with principles of multimedia learning?	
How could the design be improved?	
Did the case studies get at the right issue?	
Were the objectives met?	
Do the activities maintain learner interest?	
What were the greatest weaknesses of the training module?	
If you could change one thing, what would it be?	

Appendix J

Formative Evaluation Protocol: One-to-One Review

	The purpose of this online training module is to provide general physical education (GPE) teachers with the knowledge and skills to confidently and competently includes students with disabilities in physical education activities. Specifically, this training module will provide information about intellectual disabilities, physical disabilities, and visual impairments and the modifications that can be made for those disabilities in the activities of basketball, soccer and volleyball.
Why	The purpose of this formative evaluation plan is to identify strengths and weaknesses of the training module, gauge its effectiveness in providing the appropriate content, and determine if the instructional strategies lead to student learning. The focus of the one-to-one evaluation is to receive feedback on the user-friendliness of the training module.
What	During this evaluation I will sit in the room next to you as you review the training module. You will talk about what you are seeing and experiencing as you review the training module. By being in the room I can ask questions, observe reactions, identify areas where instruction is unclear or where content is boring. Rather than focus on each particular slide, you will answer questions about each overall phase and whether the information was presented clearly, whether the instructions were explicit and what improvements could be made to make the training module more user-friendly.
Where	You will have a 2-week window to complete your review. You do not have to do the entire review at one time (in fact, I encourage you to space it out over multiple days). These reviews will be scheduled at a time and location that are convenient for you.

One-to-One Review Questionnaire

Are the instructions clear?	
Any grammatical errors?	
Did case studies help you understand the disability?	
What could be changed in phase 1?	
What could be changed in phase 2?	
What could be changed in phase 3?	
What could be changed in phase 4?	
Were the test questions addressed in the module?	
Was the training module easy to navigate?	
Is there any content that is missing?	
Was there anything that confused you or didn't make sense?	
Do the visuals and audio work like they are supposed to?	
Did the video properly explain S.T.E.P. model?	
Suggestions for improving the module?	

Appendix K

Formative Evaluation Protocol: Small Group Review

	The purpose of this online training module is to provide general physical education (GPE) teachers with the knowledge and skills to confidently and competently includes students with disabilities in physical education activities. Specifically, this training module will provide information about intellectual disabilities, physical disabilities, and visual impairments and the modifications that can be made for those disabilities in the activities of basketball, soccer and volleyball.
Why	The purpose of this formative evaluation plan is to identify strengths and weaknesses of the training module, gauge its effectiveness in providing the appropriate content, and determine if the instructional strategies lead to student learning. The focus of the small group evaluation is to receive feedback from a representation of the target population on an almost fully developed product
What	For this formative evaluation you will review the online training module and answer the following questionnaire about your experience.
Where	You have 2 weeks to complete your review. You do not have to do the entire review at one time (in fact, I encourage you to space it out over multiple days). You can work from your own computer, at home, at the office, essentially anywhere you have access to a computer with Internet. A follow-up interview may be necessary if there is confusion regarding your feedback.

Small Group Review Questionnaire

Are the instructions clear?	
Was the design appealing?	
Did you learn anything that you did not know before?	
Did the video properly explain S.T.E.P. model?	
Were there any activities that could be added/removed/improved?	
Is this training module useful for PE teachers?	
Was there anything that confused you or didn't make sense?	
Did all of the buttons/technology work?	
Was the information presented in an interesting way?	
What confused you or didn't make sense?	
Was the training module too easy/difficult?	
If you could change one thing, what would it be?	
How long did it take you to complete the module?	
Suggestions for improving the module?	

Appendix L

Formative Evaluation Process

Formative Evaluation of an Online Training Module in Physical Education

Students with disabilities are increasingly being included in the general physical education (PE) class. However, PE teachers consistently report feeling unprepared to include students with disabilities into their PE classes (Block, Kwon, & Healy, 2016; Meegan & MacPhail, 2006; Wang, Qi, & Wang, 2015). PE teachers cite a lack of adequate training during their teacher preparation programs as a main cause for feeling unprepared (Hodge, Ammah, Casebolt, LaMaster, & O'Sullivan, 2004; Ogu, Umunnah, Nwosu, & Gloria, 2017). One way to provide continued training to inservice teachers is with the use of online learning. The field of online education has seen a rapid growth in the past few years (Means, Bakia, & Murphy, 2014). There are many advantages to using online learning, especially for inservice PE teachers. Among the benefits reported by inservice PE teachers are cost, convenience, and flexibility (Healy, Judge, & Block, 2014). Additionally, online education is perceived as providing a better learning experience than the traditional classroom method (Means et al., 2014). Research has yet to definitively show that online learning is superior to learning in the traditional classroom setting, but numerous studies confirm that online learning can provide the same level of learning as the traditional classroom setting (Smith, Smith, & Boone, 2000; Swan, 2003). Caution must be taken, however, in proclaiming that learning offered online is inherently better than traditional learning. Poorly designed instruction does not transform into effective instruction just because it is offered in an online manner (Cuban, 2001).

One way to maintain and improve the effectiveness of online education is to fully and properly evaluate the online learning materials before they are distributed. Evaluations are necessary to make judgements about the value or worth of an object (Morrison, Ross, Kalman, & Kemp, 2013). Evaluation is a process of gathering data to determine strengths and weaknesses so that improvements can be made (Tessmer, 1995). Traditionally, two main types of evaluations have been identified; summative and formative. Summative evaluations measure the degree to which outcomes were accomplished, and typically occur at the end of the process (Morrison et al., 2013). While measuring outcomes at the conclusion of a process is important, for the purposes of designing instruction it is more important to receive feedback throughout the entire development process. This type of continuous evaluation is known as formative evaluation. Formative evaluation is a critical, yet often overlooked aspect of the instruction design process, yet it plays a vital role in ensuring that the online learning is effective.

Formative Evaluation

Formative evaluation is "a judgement of the strengths and weaknesses of instruction in its developing stages, for purposes of revising the instruction to improve its effectiveness and appeal" (Tessmer, 1995, p.11). Sterbinsky and Ross (2005) assert that formative evaluations provide the feedback for instructional designers on improving instruction. Additionally, the function of formative evaluation, is to "inform the instructor or planning team how well the instructional program is serving the objectives as it progresses" (Morrison et al., 2013, p. 252). It stands to reason that formative

evaluation is a necessary part of the instructional design process, and critical for the development of effective online education.

Tessmer's Formative Evaluation Model

One of the most commonly used formative evaluation model is that of Martin Tessmer. Tessmer's evaluation model (1995) recognizes four different types of formative evaluation. The first type of formative evaluation involves the use of experts to review the instruction and provide feedback. These experts may be subject matter experts (e.g., physical education professors) or instructional design experts. The experts provide feedback on the content of the instruction and the design. The second type of formative evaluation is a one-to-one evaluation where the designer and a learner review the instruction together. In the third type of formative evaluation a small group of learners, similar to the target audience, reviews the instruction. The designer is not present during this type of evaluation. The fourth type of evaluation is the field test where the instruction is evaluated in a realistic environment with learners that are similar to the target audience.

Expert review. The purpose of the expert review is to evaluate the accuracy of the content and the technical quality of the delivery mechanism (Tessmer, 1995). It involves an expert (e.g., subject matter expert, instructional design expert) providing feedback on an initial draft of the instruction to determine its strengths and weaknesses. The biggest advantage to using experts as reviewers is that the information provided by the expert review will be different than that provided by any other type of review. Experts have a wealth of knowledge regarding the content and the instructional design that is invaluable for guiding the designer. Whereas most of the reviewers learn the

material through the lens of a learner, the expert reviewers approach the evaluation from the vantage point of somebody that already has the knowledge or experience (Tessmer, 1995). The use of expert reviewers is helpful in obtaining feedback regarding the quality and correctness of the content, how the information is presented, and how the information is received from various perspectives. The number of expert reviewers vary, but it is typical to select one or two experts for each area of expertise. Too many experts and the feedback may be overwhelming, or the feedback may become too burdensome. Too few experts, or experts in too few areas of expertise, and critical errors may be missed.

Schoen, Glance, and Thompson (2015) used a five-stage formative evaluation process to explore the views and experiences of a target audience of an electronic diabetic risk stratification tool. Expert reviewers were an important part of their formative evaluation plan. Expert reviewers were able to identify discrepancies between the language used in the risk stratification tool and the official language used in the handbook; language that may have gone unnoticed by anybody other than an expert. Similarly, Lee, Lim, and Kim (2017) used a multi-stage evaluation process to create a flipped learning design model to guide higher education instructors on creating blended learning opportunities for students. The expert review took place during phase three of their evaluation and included five content experts. The expert reviewers ensured the model was understandable and easy to use.

One reason why a formative evaluation should involve more than just expert reviewers is because the expert reviewers already know the information so they cannot understand what it is like to be viewing the information from the lens of the learner.

One-to-one. Perhaps the most commonly used type of formative evaluation is the one-to-one review (Tessmer, 1995). The purpose of the one-to-one review is to gather feedback from the point of view of the learner. By gathering feedback from the point of view of the learner, the designer gets a better understanding of how the learner perceives the training. What may be explicitly clear to the designer and an expert, who are very familiar with the topic, may be confusing and unclear to somebody not intimately familiar with the topic. Similar to expert reviews, one-to-one evaluations take place during the initial stages of the design process. In a one-to-one evaluation, the designer meets with the learner while the learner is reviewing the instruction. The main benefit of a one-to-one evaluation is the opportunity for the designer to observe how the learner interacts with the instruction and to maintain a dialogue with the learner. This running dialogue may help the designer know exactly where in the instruction things are unclear. Information gleaned from a one-to-one evaluation may be in regards to the clarity of the instructions, the interactivity of the instruction, or the level of difficulty of the instruction. The types of learners used in one-to-one evaluations are those that are typical of the target population and that represent varying levels of knowledge regarding the instructional content (Tessmer, 1995). The importance of selecting learners with varying levels of ability is due to the different types of information that can be gathered from learners of different abilities. There is no set number of reviewers needed for one-to-one evaluations, but it is important to get enough reviewers to represent different ability levels.

Schoen et al. (2015) also included one-to-one reviewers in the first and third stages of their formative evaluation process. These one-to-one reviews identified a

critical workflow issue that did not allow the users in their study to complete an important part of the risk tool. The one-to-one reviews also identified simple vocabulary and terminology issues that were easily resolved.

One-to-one reviews are typically very helpful, but they are also time-consuming. Additionally, due to the varying ability levels of the learners, the sample may not be representative of the target population. That is why a good formative evaluation will include small group reviews.

Small group. The purpose of small group evaluations is to revise the instruction to improve efficiency and effectiveness (Tessmer, 1995). Similar to one-to-one evaluations, small group evaluations are conducted with learners that are typical of the target population. Unlike one-to-one evaluations, however, small group evaluations occur later in the design process and the designer does not interact with the learner while the learner is reviewing the instruction. The number of reviewers in a small group can vary from as few as four or five to as many as 40 or 50. It is important that the reviewers provide enough feedback to improve the instruction, but not so much to overwhelm the designer.

In a formative evaluation of a computer literacy course, Martin and Dunsworth (2007) used surveys and focus groups with a group of college students to determine the optimal content to be taught in the course and the optimal instructional strategies to teach that content. Based on the feedback received from the evaluations, a number of recommendations were provided to the faculty coordinator on how to improve the computer literacy course. Louch, O'Hara, and Mohammed (2017) also used small groups to formatively evaluate a health care intervention for hospital staff interacting with

patients. The small groups approved of the intervention but provided a number of recommendations for improvement.

Field test. In a field test the instruction is evaluated in the situation in which it will be presented. The instruction should be close to being finished, but still able to be revised (Tessmer, 1995). The main benefit of the field test is that it is used to "determine if instruction will really work with its intended users in their learning environments" (Tessmer, 1995, p. 138). The field test provides the final opportunity for the designer to get feedback before the instruction is delivered to the target audience.

It may not be necessary that each of the four types of evaluations are used with every formative evaluation, but the model provides a framework for getting feedback and making revisions that will improve the content and delivery of instruction.

Application of Tessmer's Model in PE

To facilitate the need for continued training of inservice PE teachers in the field of inclusion, an online training module was developed to assist PE teachers with including students with disabilities into team sport activities within the general PE class. This asynchronous, self-paced online training module consisted of three phases. Phase 1 of the training module provided a brief overview of three common disabilities found in the school setting (i.e., intellectual disability, physical disability, visual impairment). Phase 2 introduced the learners to the S.T.E.P. model (Space-Task-Equipment-People) for making modifications to PE activities, and Phase 3 provided the learners with an opportunity to use the S.T.E.P. model to make modifications to a common PE activity.

Four main objectives guided the creation of the training module. Objective one was for the learners to identify key characteristics and limitations of disabilities

frequently encountered in PE. The second objective was that the learner will know and understand the S.T.E.P. model for making accommodations to physical activities in PE. Objective three involved the learner applying the appropriate component of the S.T.E.P. model to making modifications for certain PE activities for a student with a disability in PE. The fourth objective was for the learner to feel confident in future opportunities to include students with disabilities in PE activities.

In order to determine whether or not the online training module was effective at assisting the learners in achieving these objectives, a rigorous formative evaluation plan, following Tessmer's model, was conducted. The formative evaluation was used to help clean up any errors in the instruction, ensure the training module was designed appropriately, verify that the content in the training module was accurate, and show that the instructional strategies used in the training module were appropriately designed to maximize student learning.

Methods and Results

The formative evaluation used for this online training module consisted of three distinct sets of evaluations. The first review was an expert review that included one subject matter expert in the field of adapted PE and one instructional design expert. The second review included one-to-one reviews using learners representing three different levels of knowledge (i.e., low, medium, high) regarding including students with disabilities in PE. The third and final review was a small group evaluation with three learners representing a small sample of the target population.

Expert Review

The purpose of the expert review was to evaluate the instruction "in terms of intrinsic merits such as content accuracy or technical quality" (Tessmer, 1995, p. 47). The focus of the expert review was on content accuracy, effectiveness of content delivery methods, and efficiency in instructional design and strategy. Two experts, one subject matter expert in the field of adapted PE and one instructional design expert, participated in the evaluation. The experts were provided the online training module, the evaluation protocol, and a set of questions to be answered. They were given two weeks to complete and return their evaluation. Experts had the option of using a video recording of their screen while they reviewed the online training module to provide even more feedback for the designer, but this option was not taken by the expert reviewers. Feedback from the expert reviewers was incorporated into the online training module before the training module was sent for the small group review.

Results of the expert review. The expert review consisted of feedback from both a subject matter expert (i.e., adapted physical education) and an instructional design expert. The subject matter expert recommended limiting the amount of information about the different disabilities in Phase 1. Non-essential information was removed from the training module based on these recommendations. The subject matter expert also recommended using pictures in place of words in a few places where a picture would be more powerful or provide clarification, and to ensure those pictures appropriately represented what the training module wanted them to represent. Finally, the subject matter expert recommended filming the disability powerpoint slides and presenting them as a lecture, similar to what was done in Phase 2. Ultimately the decision was made to leave the powerpoint slides as they were, but to ask participants at the end of the study if

they preferred how the information was presented in Phase 1 (powerpoint slides that they could review at their own pace), or how the information was presented in Phase 2 (powerpoint slides presented as a lecture with a narrator discussing each slide).

The feedback from the instructional design expert centered around the use of instructional strategies. The design expert was unclear on the purpose of the instructional strategy initially used in Phase 2 as well as the sporadic use of audio throughout the training module. Audio was added throughout the training module to make it more consistent. Similar to the feedback received from the subject matter expert, the instructional design expert felt there was too much text. Finally, the instructional design expert recommended more opportunities for learners to interact with the content and receive feedback. The addition of the voiceover lecture in Phase 2 helped to address this concern as did the addition of case studies that required a typed response and the opportunity to solve a problem in Phase 3.

One-to-One

Different from the expert review, the purpose of the one-to-one review was to gather feedback from the point of view of the learner. Concurrently with the expert review, three separate, individual, one-to-one reviews were conducted. One learner had a low knowledge of the content, one learner had a medium amount of knowledge regarding the content, and one learner had a high level of knowledge regarding the content. By employing a low, medium and high learner, different potential areas of concern were identified by the different ability levels of the learners. Employing reviewers of differing ability levels (related to the content of the training module) helped to identify potential areas of concern. During this evaluation the researcher and the learner sat next to each

other as the learner took part in the online training module. Being in the room as the learner reviewed the training module allowed the researcher to ask direct questions, observe reactions, identify areas where instruction was unclear, and identify areas where the learner became disinterested. Rather than focus on each particular component of the training module, learners in the one-to-one group answered questions about each overall phase of the training module. The learners discussed whether the information was presented clearly, whether the instructions were explicit, and what improvements could be made to make the training module more user-friendly. The amount of time required to complete the training module was also evaluated by this group. Each learner was given the evaluation protocol as well as a set of questions to answer. The researcher also took notes on what was observed during the review of the training module (e.g., reactions, facial expressions, comments). The learners were given a two-week window to schedule the one-to-one review and the meeting took place at a time and location that was convenient for the reviewer.

Results of the one-to-one review. One-to-one reviews are typically the most common type of review because of the amount of information that can be gleaned from this type of review. Allowing the researcher to be in the same room as the learner allows for frequent interaction throughout the review process. Along with the protocol answers provided by the learners, the researcher is able to ask direct questions, observe body language and facial expressions, and observe how the learner interacts with the content. The feedback received during the one-to-one review for this study was consistent with the research regarding one-to-one reviews.

The information received from the one-to-one evaluations ensured the instructional materials were explicit, easy to understand, and effective at helping the learner achieve the objectives of the training module. Because three different levels of learners were used, the feedback from the one-to-one reviews provided a wide range of valuable information. For example, the low-level learner was unfamiliar with many of the terms and vocabulary used in the training module. The feedback provided by this reviewer guided the revision of the vocabulary to make it more understandable for all learner levels. Additionally, because this learner was not familiar with the content, feedback was provided that helped to identify assumptions made in the content that needed further clarification. The medium-level learner's feedback centered on the content. The reviewer felt the content was too wordy and more pictures were needed. Slides with too much information were simplified and pictures were added to address these concerns. Finally, because the high-level learner was familiar with the content, the feedback provided by this reviewer focused on the interaction with the content and the layout of the training module. Instructions were added to clarify actions, and the use of audio was made consistent throughout the training module as a result of the feedback from the high-level learner.

The feedback gathered from these one-to-one interviews was used to revise the training module before the online training module was presented to the small group.

Small group

The focus of the small group evaluation was to receive feedback from a representation of the target population on an almost fully developed product. By the time the small group reviewed the online training module, feedback provided by both the

expert reviewers and the one-to-one reviewers had been incorporated into the training module. Participants in the small group evaluated the effectiveness of the training module to see if it improved cognitive knowledge. They also evaluated how easy the training module was to use and navigate, how much time was needed to complete the training module, and whether or not the information was presented in a way that would benefit the target population. The participants were provided a link to the online training module, the evaluation protocol, and a set of questions to be answered. They were given two weeks to complete the training module and return their evaluations. Unlike the one-to-one reviews, the researcher was not be nearby to answer any questions while the small group completed the online training module. Feedback from the small group was used to make final revisions before the online training module was ready to be used in the study. Because the feedback from the expert review and the one-to-one group had already been incorporated into the training module, and because the small group review was so similar to a field test (small group, similar to target population, testing training module on own computer without assistance) the small group acted as the field test for this study.

Results of the small group review. After incorporating the feedback from the expert reviewers and the one-to-one reviewers, the modified, updated online training module was sent to a small group of reviewers very similar to the targeted population of the online training module. These reviewers commented on how long it took to complete the online training module, as well as the functionality of all of the buttons and links. The most pertinent feedback from this group regarded the use of a video lecture. One reviewer did not think the video was helpful, while another reviewer commented that the first half of the lecture video did not address the topic and was, therefore unnecessary and

irrelevant. The final version of the training module retained the video lecture, but the first part was removed so that only the relevant information was included.

The use of three different sets of reviewers provided a wealth of feedback about the technical quality of the online training module, the accuracy of the content, the usability of the program, and the effectiveness of the instruction. Each group looked at the training module from a different perspective, and the feedback gleaned from each of the three distinct groups allowed for significant improvements to be made in the design of the training module.

Conclusion

The use of online learning has the potential to provide additional training and development for inservice teachers. Online learning has shown to be as effective as traditional methods for disseminating information, and has many benefits for inservice teachers that may not have the ability to receive training in the traditional setting. However, the fact that instruction is delivered in an online format does not automatically make the instruction more effective. For online education to be truly effective it must be properly designed and evaluated. A formative evaluation is an essential component of the instructional design process. Tessmer's formative evaluation model provides a framework for conducting a thorough, rigorous evaluation of training material. The formative evaluation plan followed in this study provided a wealth of information that was used to improve the content, structure, and usability of an online training module designed to improve knowledge regarding the inclusion of students with disabilities in team sport activities in the general PE class.

Appendix M

Case Study Example

Kasey is someone everyone just loves the minute they see her. No one is sure if it's her smile, how hard she tries, or the fact that she stands just under 5 feet tall. Kasey has Down Syndrome, which among many attributes includes an intellectual disability. Kasey cannot read above a kindergarten level, and she gets confused and a little anxious when there are lots of people around and lots of people talking. Kasey is in middle school, and her favorite sport is volleyball. However, she cannot serve a ball over the net or do any of the passes unless the ball is gently tossed to her from a few feet away. Kasey often doesn't fully understand what the coach is saying or what she wants the players to do, so Kasey's peers repeat directions and sometimes add extra demonstrations or assistance. Kasey also loses focus easily and sometimes just sits down to rest, but her classmates are great at coaxing her back to participation. Kasey loves to talk to her classmates, even though they have a difficult time understanding her.

Appendix N

Training Module Evaluation Questions

1. About how much time did you spend completing the online training module?
2. Was the online training module worth your time?
3. Did you prefer to have the information presented in the form of a videotaped lecture (the STEP model) or a PowerPoint model (the disabilities)?
4. What aspect of the training module was most helpful?
5. Were there any parts of the training model that were not helpful? If so, please list them.
6. Were the objectives of the course met?
7. Would you recommend this training module to other PE teachers?
8. Any other suggestions/recommendations?