The Impact of Online Professional Development on Physical Educators' Knowledge and Implementation of Peer Tutoring

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## Abstract

Physical educators report challenges in including students with disabilities (Ammah & Hodge, 2006; Chandler & Greene, 1995; Hardin, 2005; Hodge, 1998; Kowalski & Rizzo, 1996; Linert, Sherrill, & Myers, 2001; Qi & Ha, 2012). The ability of traditional professional development (PD) to provide the teachers with the skills and knowledge they require to effectively educate students with disabilities is hindered by barriers, such as cost and availability. Online professional development (OPD) has the potential to overcome these barriers as it can be made available to teachers at their convenience, can provide just-in-time assistance, give schools access to experts and resources otherwise unavailable, and is more scalable than professional development that depend on local resources or non-online training (Dede, Jass Ketelhut, Whitehouse, Breit, & McCloskey, 2008). However, the effectiveness of OPD focused on inclusive physical education has yet to be examined.

The purpose of this randomized experimental design study was to determine the effectiveness of an OPD course to enable physical educators to implement a peer tutoring program in their classes. The study involved three elements: (a) teachers completed a pre-test, post-test and retention test that assessed their knowledge of peer tutoring to answer the question "does an OPD course provide physical educators with increased knowledge about peer tutoring?" (b) teachers were asked to self report on their ability to apply the course's lesson to determine their perceived ability to implement peer tutoring. (c) teacher completed a Perceptions of Professional Development Survey (Buschang, 2012) to assess their perception of the online environment as a setting for professional development.

Results revealed (a) participation in an OPD course resulted in a significant increase in knowledge related to peer tutoring for physical educators who participated in the OPD course relative to physical educators who did not complete the OPD course; (b) participation in an OPD course resulted in 22% of participants (n = 8) implementing all preparation and training activities and 47% (n = 17) completed some activities, and (c) physical educators perceived the online environment as a positive setting for PD. Discussion involves an interpretation of findings and an analysis of issues relating to OPD including application of PD lessons to the class, dropout, and social interactions within the online environment.

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### INTRODUCTION

The Individuals with Disabilities Education Act (IDEA), enacted in 1975, mandated that children and youth ages 3-21 with disabilities be provided a free and appropriate public school education. As of 2011, 13% of the total students population enrolled in public school are being served by federally supported special education programs (US Department of Education, 2013), equating to 6,419,000 students receiving special education and related services under IDEA (United States Department of Education, 2013). In addition, as of Fall 2010, 95% of children and youth with disabilities in the US received their education in regular schools. However, the effectiveness of this education remains a contentious issue.

The IDEA stated that students served in special education must have physical education instruction and this must occur in the least restrictive environment (LRE) to the maximum extent appropriate. According to the Governmental Accountability Office (GAO) (2010), for the majority of students with disabilities (92% at elementary level and 88% at the secondary level), this results in participation in general physical education (PE). The GAO's 2010 report, however, highlighted that schools face various challenges in achieving successful inclusion in PE, particularly pertaining to the lack of preparation of PE teachers to work with students with disabilities. Research involving PE teachers attested to this lack of training (Ammah & Hodge, 2005; Chandler & Greene, 1995; Hardin, 2005; Hodge, 1998; Kowalski &

Rizzo, 1996; Linert, Sherrill, & Myers, 2001). For example, teachers reported to be positively disposed to inclusion as an educational philosophy but had varying degrees of success in achieving successful inclusion in PE (Hodge, Ammah, Casebold, Lamaster, & O'Sullivan, 2004). More recent works reflected this positive disposition to inclusion (Doulkeridou et al., 2011; Jerlinder, Danermark, & Gill, 2010; Obrusnikova, 2008). Conversely, some research deviated from this result, such as research by Vickerman and Coates (2009) in which only 62% (out of 221 PE teachers) agreed or strongly agreed that students with disabilities should be included in mainstream PE. Variables that affect this attitude have also been examined and has revealed that females (Meegan & MacPhail, 2006), prior experience with students with disabilities (Tripp & Rizzo, 2006), class size (Hodge, et al., 2009), helpful classmates (Ammah & Hodge, 2005), academic preparation (Block & Rizzo, 1995; Jerlinder, 2010, Klavina, 2008; Tripp & Rizzo, 2006), nature of the disability (Obrusnikova, 2008), and high perceived confidence (Ammah & Hodge, 2005; Hersman & Hodge, 2010) in working with students with disabilities all positively affecting the attitude of teachers to work with students with disabilities. Conversely, lack of in-service training, inadequate preparation and the type and severity of the disability was repeatedly shown to inhibit successful inclusion in PE (Qi, & Ha, 2012). Students with disabilities have given voice to their experience of inclusion. They have spoken of both positive and negative experiences in inclusive PE. Common positive themes, highlighting the potential of inclusive PE, include gaining social benefits and successfully participating in class activities. Unfortunately many students with disabilities also spoke of the negative experience of PE including

experiencing isolation, bullying and unsuccessful participation (Spencer-Cavaliere & Watkinson, 2010; Goodwin & Watkinson, 2000; Healy, Msetfi & Gallagher, 2013).

With adequate preparation of PE teachers repeatedly noted as being important for effective inclusive PE (Block & Rizzo, 1995; Jerlinder, 2010; Klavina, 2008; Tripp & Rizzo, 2006), a review of current teacher preparation practices was worthwhile. Currently, to teach students will disabilities in general PE, teachers typically received just one course devoted to adapted physical education (Piletic & Davis, 2010). There has been a paucity of literature examining the content, methodology and student competence related to this course (Folsom-Meek, Nearing, & Kalakian, 2000). However, Piletic & Davis (2010) recently examined an introduction to adapted physical education course for PETE preparation programs using a sample of 129 colleges/universities from 41 states. Sixty-nine percent (n = 91) indicated that only one course in APE was offered to trainee teachers. 31% (n = 40) were offered an additional course but for only 15% (n = 6) of these was the extra courses required. This situation, concerning pre-service training, impacts on the teacher's ability to effectively include students with disabilities when they enter the teaching field.

To overcome this inability and enable the PE teacher to provide effective physical education to students with disabilities, appropriate professional development, the "link between the implementation of education reform and its ultimate success" (DeMonte, 2013, p.2) must be implemented. Physical educators have benefited from a variety of face-to-face professional development programs; both traditional (Faucette, Nugent, Sallis, & McKenzie, 2002; Martin, McCaughtry, Kulinna, & Cothran, 2008; Murphy & O'Leary, 2012) and reform (Patton & Parker, 2013; Armour & Yelling, 2007; McCaughtry, Martin, Kulinna & Cothran, 2006; Keay, 2006). Reform professional development was defined as "interactions with teachers around teaching and learning, including conversations about instruction, peer observation and feedback, and advice asking about instruction" (Garet, Porter, Desimone, Birman, & Yoon, 2001, p. 324). The success of this professional development, however, is limited by barriers such as cost, time, location and availability (Armour & Yelling, 2007). To overcome such challenges and continue to allow teachers to keep abreast of emerging knowledge and refine their conceptual and craft skills to become more competent (Guskey, 2000), online professional development (OPD) programs are increasingly being implemented. These course are available to teachers at their convenience, can provide just-in-time assistance, give schools access to experts and resources otherwise unavailable, and are more scalable than professional development that depend on local resources or non-online training (Dede, Jass Ketelhut, Whitehouse, Breit, & McCloskey, 2008).

A review of the literature on educating students with disabilities in inclusive PE reveals six strategies that have empirical support as being effective. These strategies may be beneficial topics for OPD for physical educators to increase their ability to teach students with disabilities.

- Paraprofessionals: (Murata & Jansma, 1997)
- Adapted physical education Professionals (Vogler et al., 2000; Block & Zeman, 1996; Vogler, Koranda, & Romance, 2000)

- Collaborative Team Approach (Heikinaro-Johansson, Sherrill, French, & Huuhka, 1995)
- Embedded Instruction (Valentini and Rudisill, 2004)
- Cooperative Learning (Grenier, 2006)
- Peer tutoring: Houston- Wilson, Lieberman, Horton, & Kasser, 1997;
   Ward & Ayvazo, 2006, Klavina & Block, 2008; Lieberman, Newcomer,
   McCubbin, & Dalrymple, 1997; Lieberman, Dunn, van der Mars, &
   McCubbin, 2000; Wiskochil et al., 2007; Klavina & Block, 2008; Temple
   & Lynnes, 2008

Despite some evidence being dated, the trend towards the use of these strategies made them worthy for contemplation as OPD course content (for example more than 14 states have now defined an endorsement or certification in adapted physical education).

Each will be examined in chapter two, however, peer tutoring has been chosen as the focus for this study due to low cost, practicality, and empirical support showing improved physical and social experience for students with and without disabilities in inclusive physical education (Block & Obrusnikova, 2007; Klavina & Block, 2008). In addition, the PI deemed the time necessary for teachers to learn the content needed for the implementation of a peer tutoring program to align with the five hours proposed by the Virginia Department of Education for short term teacher professional development. Prior to the development of an OPD program it is necessary to examine prior research conducted on OPD.

There is growing amount of research exemplified the potential of OPD for general teachers. For example, Masters, Magidin deKramer, O'Dwyer, Dash and Russell (2010) demonstrated how an OPD improved the knowledge and instructional practices of elementary school English language teachers. Similarly, Fisher, Schumaker, Culbertson and Deshler (2010) revealed how teachers who participated in an OPD practiced a higher rate of targeted instructional behaviours which resulted in increased student learning. Other studies compounded these positive results, demonstrating teacher practice improvement after participating in OPD (e.g., Fishman, Konstantopoulos, Kubitskey, Vath, Park, Johnson, & Edelson, 2013; Powell, Diamond, Burchinal, & Koeler, 2010. The demonstrated potential of OPD warrants its examination as a means to rectify the shortcomings of physical educators' ability to include students with disabilities. However, in doing so, one must be cognizant of the failings of past research. Several issues repeatedly arise, limiting the usefulness of research in this area; most notably, the absence of a theoretical foundation for the PD programs being studied. Future research in this field must seek to overcome this limitation.

Prior to the creation of the OPD course, the PI examined several theories that may serve as the theoretical foundation for the course, including selfdirected learning (Tough, 1967; 1971), transformative learning theory (Mezirow, 2000) and andragogy (Knowles, 1968). Knowles theory of andragogy (1968) was chosen as the most appropriate for a number of reason: (1) it is deemed to be the best-known theoretical approach to adult learning and much literature exists promoting its use for adult education, including teacher education (Terehoff, 2002), (2) research has documented it effectiveness for the creation and implementation of online OPD for adults (e.g. Quinney, Smith, & Galbraith. 2013), (3) its assumptions reflect and encompass those of other adult learning theories; it therefore more comprehensive, and (4) Knowles posits four principles that guide the application of the theory to teaching, thus assisting the development of a OPD course guiding by this theory. At the heart of andragogy are the five assumptions of the adult learner as posited by Knowles:

- Adults prefer self-direction in learning
- Adults bring a vast reservoir of experience that should be considered in planning learning experience
- Adults exhibit a readiness to learn that is based on a need to know something or do something
- Adults exhibit an orientation to learning that is task- or problemcentered rather than subject-centered, and
- Adults exhibit a relatively high degree of internal motivation.

To capitalize on these characteristics, Knowles (1984) posits four principles that should guide the instruction of adults:

- Adults need to be involved in the planning and evaluation of their instruction.
- Experience (including mistakes) provides the basis for the learning activities.

- Adults are most interested in learning subjects that have immediate relevance and impact to their job or personal life.
- Adult learning is problem-centered rather than content-oriented.

Research has demonstrated how these principles can be effectively applied to adult education programs including PD (Glazer, Hannafin, Polly & Rich, 2009; Quinney, Smith, & Galbraith, 2013). However, despite the literature that exists promoting its use for adult education, including teacher education (Terehoff, 2002), research on the application of andragogical theory is rife with problems; small samples sizes, predominantly qualitative research designs, lack of detail of methods, lack of a control group and inconsistent application of the principles of andragogy all permeate research in this area.

In addition to incorporating principles from adult learning theory into the design and delivery of teacher PD programs, when utilizing multimedia, we must also consider relevant instructional design theories so as the method of information delivery is most effective for the learner. Mayer's (1998) cognitive theory of multimedia learning (CTML) is one theory that has been used to create an empirically validated design process (e.g. by Kennedy and colleagues, 2011, 2012, 2014). It is based on the premise that individuals: (1) possess two separate channels for processing visual and auditory information; (2) are limited in the amount of information that they can process in each channel at one time; and (3) engage in active learning by attending to relevant incoming information, organizing selected information into coherent mental representations, and integrating mental representations with other knowledge. To successfully respond to these assumptions of the learner, the instructor must consider three elements in designing and delivering instructional material. Instructors must seek to: (1) reduce extraneous processing; this is cognitive processing that does not support the instructional goal and is attributable to confusing instructional design; (2) manage essential processing; this is cognitive processing needed to mentally represent the incoming material and that is attributable to the complexity of the material; and (3) foster generative processing; this is cognitive processing aimed at making sense of the incoming material, including organizing it and integrating it with prior knowledge (Mayer, 2005). Mayer offers 10 research-validated design principles to aid the instructor in underpinning learning materials with the principles of CTML (Table 1).

## Table 1

# Mayer's Principles (2009)

# Research-BasedBrief description of Mayer's instructional designInstructional Designprinciples)Principles

Coherence	Instructional materials are enhanced when
Principle	irrelevant or extraneous information is excluded
Signaling	Learning is enhanced when explicit cues are
Principle	provided that signal the beginning of major headings
	or elements of the material being covered
Redundancy	Inclusion of extensive text (transcription) on screen
Principle	along with spoken words and pictures hinders
	learning. Carefully selected words or short phrases,
	however, augment retention
Spatial	On screen text and pictures should be presented in
Contiguity Principle	close proximity to one another to limit eye shifting
	during instructional presentations
Temporal	Pictures and text shown on screen should
Contiguity Principle	correspond to the audio presentation
Modality	People learn better from spoken words and pictures
Principle	than they do from pictures and text alone

Segmenting	People learn better when multimedia presentations
Principle	are divided into short bursts as opposed to longer
	modules
Pretraining	People learn better when there is an advance
Principle	organizer that highlights and reviews key content
	prior to instruction
Multimedia	People learn better from pictures and spoken words
Principle	than from words alone
Personalization,	Narration presented in a conversational style result
Voice, and	in better engagement and learning than more formal
Image Principles	audio presentations. Images should be non-abstract,
	and clearly represent the content being presented.

Recent research by Kennedy et al., demonstrated the successful application of Mayer's principles in the design of educational podcasts for preservice teachers. For example, Kennedy (2011) demonstrated that enhanced podcasts, designed using CTML principles, were more effective in providing knowledge about education for children with disabilities to preservice teachers in comparison to audio only. Similarly, Kennedy and Thomas (2012) attained positive results demonstrating the effectiveness of CTML-based podcasts to teach preservice teachers in the use of behavioral supports. The application of the knowledge taught using these podcasts remain to be assessed. Although this research examined the use of CTML-based podcasts for the development of preservice teachers, the positive results revealed warrant its use for in-service teachers.

The literature suggests that the application of andragogy to the design of an OPD focused on peer tutoring for physical educators, coupled with the application of CTML to the media used for the asynchronous delivery of information, will result in an effective OPD program. The challenge remains to effectively ground the OPD in theory and avoid the many research design failings that limit current research in this area.

#### **Statement of the Problem**

Research revealed the challenges experienced by physical educators in including students with disabilities (Ammah & Hodge, 2006; Chandler & Greene, 1995; Hardin, 2005;; Hodge, 1998; Kowalski & Rizzo, 1996; Linert, Sherrill, & Myers, 2001; Qi & Ha, 2012). OPD may be an effective means to deliver the training needed to enable teachers to better include students with disabilities. overcoming the barriers, such as cost and availability, which have shown to hinder teachers' participation in face-to-face PD (Armour & Yelling, 2007). However, research on OPD in the area of inclusive physical education is nonexistent. Researching OPD presented a variety of challenges; challenges that compromised many of the findings in current research on OPD. The absence of theory in the design and implementation of OPD is one shortfall that repeatedly arises. Future research must seek to rectify this. Andragogy and CTML both show great promise for the design and implementation of effective OPD. Used successfully in previous studies (for example and ragogy provided the foundation for a training program for library staff (Quinney, Smith, & Galbraith, 2013) and CTML principles were applied to enhanced- podcasts used for preparing English language teachers (Kennedy, 2011), together they offer guidance for the structure and delivery of OPD. Research on the effectiveness of an OPD course, designed upon the principles of and ragogy and CTML would contribute to the knowledge base of teacher OPD, and specifically, the PD of physical educator to better include students with disabilities.

#### **Purpose of the Study**

The purpose of this randomized experimental design study was to determine the effectiveness of an OPD course to enable physical educators to implement a peer tutoring program in their classes. Specifically, does an OPD course provide physical educators with increased knowledge about, and perceived ability to implement, peer tutoring, and do the teachers perceive the online environment as a satisfying environment to receive professional development? Research demonstrated that PE teachers require training to better include students with disabilities in their classes. Research has yet to examine the effectiveness of the online environment to assist in this task. It is hypothesized that an online course will increase teachers' knowledge about, and ability to implement, peer tutoring.

#### **Research Questions with Corresponding Hypotheses**

**RQ 1:** What is the effect of participation in an OPD course on knowledge related to peer tutoring for physical educators relative to physical educators who do not complete the OPD course?

Ho: Physical educators' knowledge of peer tutoring will not increase as a result of completing the online PD course on peer tutoring.

H1: Physical educators' knowledge of peer tutoring will increase as a result of completing the online PD course on peer tutoring.

**RQ 2:** In what ways, if any, does participation in an OPD course result in teacher implementation of a peer tutoring program in a physical education class? Ho: Participation in an asynchronous course will not enable physical educators to implement a peer tutoring program.

H1: Participation in an asynchronous course will enable physical educators to implement a peer tutoring program.

**RQ 3:** How do physical educators perceive the online environment as a setting for professional development?

Ho: After participation in the asynchronous course, teachers will perceive the online environment as being an ineffective setting for receiving professional development.

H1: After participation in the asynchronous course, teachers will perceive the online environment as being an effective setting for receiving professional development.

#### **Definition of Terms**

Within the context of this study, the terms were defined as follows: *Andragogy.* Knowles (1980) defined andragogy as the "art and science of helping adults learn," positing four principles for its application to teaching. *Asynchronous instruction:* Instruction without the use of fixed time intervals between the presentation of instructional stimuli and student responses (Moore, 2007).

*Cognitive Theory of Multimedia Learning (CTML).* A cognitive theory of multimedia learning based on three main assumptions: there are two channels for processing information (auditory and visual); there is limited channel capacity; and that learning is an active processing, selecting, organizing, and integrating information (Mayer, 2001).

*Enhanced Podcasts.* A means of presenting information using still images synchronized with audio (Kennedy et al., 2011).

*Inclusion.* An interpretation of the term least restrictive environment (LRE) which defined within the federal law as:

(i) To the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are nondisabled; and

(ii) Special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only if the nature or severity of the disabilities is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactory (US Department of Federal Register, "2006, § 300/114; Federal Register, 2006). *Professional development:* "Those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (Guskey, 2000, p. 16).

*Online Professional Development:* Processes and activities accessible online that serve to enhance professional knowledge, skills and attitudes of educators.

#### Delimitations

The study is delimited by the following factors:

- Only data from teachers who grant permission for their information to be used for study purposes will be included.
- Only content knowledge, self-report application of this knowledge, and perspective of the online environment as a setting for professional development will be assessed in this study.

#### Limitations

The follow limitations affect the generalizability of the findings.

- All participants volunteered to take the OPD course and volunteered to participate in the study. Factors such as being as the teacher's opinion of peer tutoring or technology may have increased some teachers' willingness to be involved, and similarly, preventing other teachers from enrolling in the course.
- Self-report was the primary method of data collection on the teachers application of the lesson learned on the course. The accuracy of inferences drawn from this data is dependent upon the honesty of the teachers' reports.
- The teachers may choose when to audio-record their class during the application activities; the time chosen to audio record may not be a true reflection of the class.
- Due to the asynchronous nature of the course, it is not possible for the researcher to ensure the experimental and control group complete pre, post and retention tests at the same times.
- In completing the online learning satisfaction survey, the teachers may report socially accepted answers, or answers to appease the course creator.

## LITERATURE REVIEW

The central question guiding this study is "how does an online asynchronous professional development course affect elementary school physical educators' ability to implement a peer tutoring program?". This chapter described the scholarly literature relevant to this study. First, it examined literature pertaining to adult learners and the impact this literature had on the development and implementation of an online course. Second, literature on professional development (PD) was explored; this allowed for the principles deemed necessary for effective PD to be defined. Third, an analysis of the literature specific to online PD was described, and finally, the literature on instructional design, a key component of online teaching, was explored.

To ensure correct inferences are made from the literature and the course design, implementation and evaluation is evidence-based, literature included in the review will, when possible, adhere to specific inclusion criteria. Where a scarcity of quality research exists or the inclusion of literature is deemed relevant and beneficial despite failing to meet the inclusion criteria, the reader will be alerted to this. The inclusion criteria are as follows:

- Is group membership determined through a random process or has baseline equivalence been demonstrated?
- Do rates of attrition compromise comparability of the intervention and comparison groups?

• Is there evidence that the dependent variables uphold standards of:

(1) Face validity (a sufficient description of the dependent variable must be provided);

(2) Reliability (internal consistency [e.g. Cronbach's alpha] or .5 or higher or test-retest reliability of .4 or higher); and,

- Are data collection period equal for both experimental and comparison groups (including timing of data collection, personnel responsible for data collection, and construction of data collection measures are equal)?
- Are the experimental and experimental groups without cofounding factors?

#### **Adult Education**

To effectively facilitate adult education, an understanding of how adults learn is essential. Lindeman's (1923) publication "The Meaning of Adult Education" marked the emergence of adult education in the US. Lindeman was critical of the transmission model of education; with learners as "empty vessels waiting to be filled" (Lock, 1947). Lindeman believed the facilitator had a role to "evoke-- to draw out, not pour in" (p. 88). Lindeman's work influenced many adult educators, including Malcolm Knowles. To better understand the construct of adult learning, Knowles' theory of adult learning, as well as several other theories that are applicable to discussions on adult learners, will be explored; commonalities discussed and research assessing their effectiveness for adult education examined.

#### Andragogy

Based on observations in his own work with adult learners, Malcolm Knowles defined his work as andragogy in the late 1960's (Knowles, 1980). Andragogy, viewed as a "system of concepts" by Knowles (1984, p. 8), has been referred to as a "theory, method, technique and set of assumptions" (Davenport & Davenport, 1985, p.152). At the heart of andragogy are five assumptions of the adult learner as posited by Knowles. Originally such assumptions contrasted with the assumptions of pedagogy, which supposes learners to be dependent and bringing little experience to the educational process. This dichotomy was later revised by Knowles, and andragogy and pedagogy were determined to be on a continuum, with the learner characteristics dependent on circumstances and needs of the learner, and not determined by age (Knowles, 1984). Knowles' assumptions of the adult learner were:

- Adults prefer self-direction in learning
- Adults bring a vast reservoir of experience that should be considered in planning learning experience
- Adults exhibit a readiness to learn that is based on a need to know something or do something
- Adults exhibit an orientation to learning that is task- or problemcentered rather than subject-centered, and
- Adults exhibit a relatively high degree of internal motivation.

To capitalize on these assumptions, Knowles suggested four principles that should be applied to the planning, implementing and evaluation of adult learning (1980). These principles are the practical applications of andragogy.

First, adults need to be involved in the planning and evaluation of their instruction. This principle relates to the assumption of adult learners as having a need for self directed learning. In self directed learning the onus is on the learner to take the initiative in assessing the learning needs, determining the learning goal, accessing the human and material resources necessary for learning, and evaluating the learning outcomes (Knowles, 1975). Self directed learning is characterized by personal responsibility (Brockett & Hiemsta, 1991), self planning (Tough, 1971), and control (Carre, 2000). According to Knowles, the proactive, self directed learner gains three benefits from this learning style: they have increased motivation, learn better and learn for longer:

"They enter into learning more purposefully and with greater motivation. They also tend to retain and make use of what they learn better and longer than do the reactive learners" (Knowles 1975, p.14).

The second principle relates to experience (including mistakes) providing the basis for the learning activities. A key defining and differentiating characteristics of the adult learner is that they fulfill multiple roles (Ross-Gordon, 2011). The adult learner is often also a worker, parent, spouse, and community member. In this principle, Knowles recognizes the importance of acknowledging these vast experiences that adult learners have accumulated. Andragogy is rooted in a humanist perspective of learning, as Goldgrab wrote (in Draper & Taylor, 1992) learners should be seen for "what they have to give, their ideas as individuals and for their life experiences and common sense" (pp. 240-242). These assets may contribute to, provide motivation for or bias learning.

The third principle states that adults are most interested in learning content that has immediate relevance and impact to their job or personal life. As an individual matures and gains experiences, the demand for relevancy of learning increases. There is a shift from subject based learning, to task based learning. Knowles (1984) saw adults as individuals who pursue learning because they need to immediately apply the content to a life situation. Therefore effective learning should be structured around life situations and the relevance of the learning content to the learners' life must be clarified.

Knowles' final principle is that adult learning is problem-centered rather than content-oriented. Similar to, and extending from, the adults' need for relevance and an immediate impact of learning, a real life problem creates an ideal impetus for learning to occur. Focusing the learning on this problem will satisfy the adults' "need to learn in order to cope more satisfyingly with real-life tasks or problems" (Knowles, 1980 p. 44).

#### **Andragogy: Theory to Practice**

Although much literature exists on how andragogy principles can be applied to various field of adult education, including teacher PD (Terehoff, 2002) and nursing education (Norrie & Dalby, 2007), fewer studies examined the effect of an andragogy-based instructional design program. The primary reason for this, and a common contention in the body of literature critiquing andragogy, was that the andragogy cannot be measured (Merriam, Caffarlla & Baumgartner, 2007). The variability in the application of andragogical principles makes it difficult to make inferences from research that integrates the andragogical framework within an adult learning experience. The ability to make inferences was further hindered by poor study design. No studies were found that upheld the inclusion criteria stipulated in the introduction to this section. However, it is beneficial to examine some studies that do exist evaluated the effectiveness of andragogical based learning programs, being cognisant of the research design weaknesses.

A study by Quinney, Smith, and Galbraith (2013) involved 96 library staff and faculty of Brigham Young University who completed a self-directed training program aimed to increase their knowledge and use of technology. The researchers provided details on how each of the andragogical principles was applied to the program, a surprisingly rare feature of research in this area. Selfdirection was attained by giving the participants the flexibility to select which technology task and challenges they would complete. In addition participants had flexibility regarding learning materials used and pacing of lessons. The participants experience was incorporated into learning through facilitating small group discussions that encouraged participants to reflect on real work and personal experiences. The principle of immediate relevance was applied to this training program through presented the learners with information demonstrating the divide between their current technology knowledge and that of the students they serve. Finally the principle of immediate application was met by providing the learners with skills that were directly related to their job or personal lives; for example, in training the learners on photoshop, the learners were encouraged to bring in their own photographs to work on. A pre and post survey evaluated the learner's current use of technology. A lack of detail on the survey's creation and content make interpretations of results difficult, although researchers did conclude that the program was successful in teaching technology skills and promoting lifelong learning. In addition, the absence of a control group also hindered interpretation of the results. However, a strength of this study was the detail given regarding how each of Knowles' principles was applied to the program. Future research should replicate this considered and detailed application of the andragogical principles.

The methodological problems seen in much of the research on the application of andragogical principles to educational programs is exemplified in a pilot study by Bishop (2006) at Open University. In this study the researchers only provided details as to the application of Knowles first principle; the need for self directed planning and learning. This was attained through granting responsibility to students over materials used for learning. The students had the ability to draw from a bank of language resources they required based on their personal or professional requirements. The course facilitator only served to guide learning and to provide advice on how to use the bank of materials. The authors stated that such an application of andragogical principles allowed for the natural enthusiasms of the learners to be harnessed and courses to be offered which responded to quickly and cheaply to the demands of the market. The learners were reported as being "very positive," yet very little further detail was provided. In addition, just three students participated in this study. The small sample size, lack of detail on the application of andragogical principles and lack of a control group in this study reflect the problems that permeated research in this area.

The lack of methodological sound quantitative studies further compounded the inadequacy of research in this area. Woodward (2007) conducted a quantitative study on how adult learning theory can inform a training program for newly-hired employees in industry. However, the extreme lack of detail regarding the program and analysis made the study impossible to replicate and inferences futile.

In light of the absence of methodologically sound research on the application of andragogical principles educational programs, one may also examine research that does not specifically define a theoretical framework but the program design does reflect the principles of andragogy. For example, Glazer, Hannafin, Polly and Rich's (2009) study focused on an eight week professional learning program completed by two teacher leaders and nine volunteer participants that aimed to increase technological integration in the classroom. Although it did not define its theoretical framework as being adult learning theory the program was designed and implemented on the tenets of adult learning theory (e.g. the need for self-direction was attained through the teachers collaborating to create program goals and develop activities, the learners experiences were utilized through small group discussions that helped
guide the focus of the program; immediate relevance and application was assured through the learners ability to design activities and use tools that they could use in their lessons and that focused on curriculum gaps). Interviews, field notes, and reflective journals were used to assess the participant's perspective of the program. It was concluded that all participants increased their skills and technology comfort level; however only one third of participants achieved program objectives.

Knowles theory of andragogy (1968) is deemed to be the best-known theoretical approach to adult learning and much literature exists promoting its use for adult education, including teacher education (Terehoff, 2002). However, research on the application of andragogical theory is rife with problems; small samples sizes, predominantly qualitative research designs, lack of detail of methods, lack of a control group and inconsistent application of the principles of andragogy all demonstrate the multi-faceted nature of research in this area. Despite the myriad of limitations that permeated the body of research on this topic, taken collectively, these studies do demonstrate the potential of adult learning theory as an effective basis for design and implementation of adult learning programs. The challenge to the researcher of this study is to overcome the issues highlighted in andragogical research in the design, implementation, evaluation and write-up of this study on the effectiveness of an online PD program.

## Alternative theories of adult learning

Alternative theories of adult learning were also examined when deciding upon the theoretical framework for the planned online course. Self-directed learning, a theory of adult learning first described as a form of study by Tough (1967; 1971) reflects the first principle of andragogy. Echoing what Knowles put forth for his first principle, this theory suggests that a shift in control from instructor to student would result in greater learning (Candy, 1991). Furthermore, and in support of this theory, it has been argued that imposing learning on adults actually results in a resistance to learning (Fidishun, 2000). Self directed learning involves several key components: (a) it should involve initiative of the learner; it is purposeful learning (Knowles, 1984); (b) the learner should have control (Carre, 2000) and has choices over what and how to learn and (c) the learner is involved in self-planning (Tough, 1971); the learner sets the learning goal and plans for its fulfillment. Similar to how we might apply Knowles first principle of the adult learning theory, this theory suggests control of the learning is transferred to the learner.

In the 1970's, offering a different lens through which we can view adult learning, Jack Mezirow suggested that adult learners should embark on a process of transformation of their core frames of reference, often in response to a "disorientating dilemma" (Ross-Gordon, 2011); thus transformative learning theory was founded. This theory posits that learning occurs by "elaborating existing frames of reference, by learning new frames of reference, by transforming points of view, or by transforming habits of mind" (Mezirow, 2000, p.19). Adult educators should look to create these impetuses for transformation and prompt critical dialogue and reflection that challenge preconceived notions the adult learner may have.

### Summary of adult learning theory

The review of literature revealed several theories of adult learning that may inform and influence the design of the online course. Due to the comprehensive application principles outlined by Knowles, that have been demonstrated to be successfully integrated into past adult education courses (e.g. Quinney, Smith, & Galbraith, 2013), it has been chosen as the theoretical framework for the planned study. However, to maximize effectiveness of an online PD program, a literature review must extend beyond that of adult education, and extract lessons learned from research on PD of teachers. In the following section, the researcher will examine recent literature, and some seminal works, which converge on the features of effective physical education PD.

## **Physical Education Teacher Professional Development**

PD has long been noted as being the "link between the implementation of education reform and its ultimate success" (DeMonte, 2013, p.2). PD is an experience that improves teachers' knowledge, informs pedagogy and contributes to personal and professional growth (Cohen, McLaughllin & Talbert, 1993). The No Child Left Behind Act (2001) mandated that districts offer PD to teachers focusing on content knowledge sufficient to meet the requirements of teachers being highly qualified (U.S. Department of Education, 2010). To ensure success of PD one must consider the characteristics shown to be pertinent to effective PD programs. To understand, and contrast methods of PD in physical education, the various formats of PD used were first defined and then their application to the field of physical education examined. Due to a lack of research on online PD for physical educators, traditional and reform PD, and the lessons learned were first explored.

### **Traditional PD**

Traditional PD is defined as "workshops, conferences, coursework and mandated staff development" (Feiman-Nemser, 2001). It is typically face-to-face and led by experts. Results of research focused on the effects of traditional PD for physical educators were inconclusive. Inadequate methods of data collection and an absence or lack of detail on theoretical frameworks underpinning the PD programs demand a critical view be taken on the results.

Martin, McCaughtry, Kulinna, and Cothran (2008) examined the effects of two health-related traditional PD programs. The programs focused on how to teach a physical activity orientated curriculum titled the Exemplary Physical Education Curriculum (EPEC). This was a Midwestern school district's newly adopted elementary physical education curriculum. Fifty teachers were assigned to one of three groups: group 1 participated in a three, eight-hour PD workshops; grounded in self-efficacy theory by providing knowledge, master teaching experiences, persuasive feedback, and experienced role models. Group 1 also received two school site visits by teachers experienced in teaching EPEC. Group 2 participated in just one eight-hour workshop utilizing the same instructional methods and activities. Group 3 served as the control group; receiving no PD. Assignment was not random due to some teachers requesting attendance in certain groups. An EPEC 35 item self-efficacy survey was administered at four time points; at the beginning of the academic year, before the workshop, after the workshop and at the end of the academic year. Content validity was established through matching the survey items with the EPEC objectives and achieving consensus among the four researchers on the survey items. A general education efficacy scale developed by Bandura (1990) was also completed by the teachers to assess teacher efficacy across seven areas that impact on teacher behavior and subsequent student learning. A multivariate analysis of variance (MANOVA) was performed to determine if the three groups had equivalent scores at baseline. This analysis was not significant, indicating that the groups were similar in efficacy at baseline. Repeated measures MANOVA were then calculated between groups. Results showed both groups who participated in PD to score significantly higher on the EPEC survey; including efficacy to teacher motor skills objectives (F[1, 28] = 7.26, p = .01, physical activity and fitness knowledge objectives (F[1, 28] = 8.50, p = .01), personal and social objectives (F[1, 28] = 3.29, p = .08) and community efficacy (F[1, 28] = 3.08, p = .09). Teachers in both groups maintained disciplinary efficacy (F[2, 47] = 4.29, p = .02), whereas the control group suffered a loss of disciplinary efficacy. Associated effect sizes were moderate to large. There was no significant difference between groups who participated in the traditional and extended traditional format. A strength of this research study was that the theoretical foundations of the workshops were

detailed; both workshops were grounded in self-efficacy theory with learners provided with EPEC-related knowledge, mastery teaching experiences, persuasive feedback, experienced role models, and eliminating barriers. The inclusion of a retention test was also a beneficial component of this research; a component noticeably absent in much of the other research in this field.

Murphy and O'Leary (2012) also examined the effectiveness of a PD program for focused on curriculum implementation for primary school physical educators in Ireland. The PD program, called the National In-service Physical Education Program (NIPEP) attempted to "mediate the Primary School Curriculum for teachers towards enabling them to implement it in their schools" (PCSP, 2007). Adult learning, including transformative learning theory, as well as literature on PD and program design, influenced the design and implementation of the program. The program consisted of two, daylong seminars, each followed by a day dedicated to planning for implementation of the curriculum. Details on seminars' instructional methodologies and activities were sparse; it was noted that the approaches and methodologies suggested in the curriculum were illustrated but no further details were provided. All seminars were facilitated by a trained tutor. The program was offered to all primary physical educators. A pragmatist theoretical framework led to the use of a mixed methods research design to answer the research questions. The first question related to the tutors preparedness to implement the NIPEP. This involved a questionnaire survey of all tutors (n = 26), interviews with a convenience sample of tutors (n = 6), observation of all tutors as they engaged with the program and an observations

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of the tutors as they taught PE in their own schools and facilitated the program workshop. To answer the second question; what were the classroom teacher's perspectives on the curriculum, three types of data were collected: (1) 85 teachers from three different workshops (one rural, two urban) completed questionnaires based on the readiness to facilitate were completed by participating teachers; (2) researchers observed three separate seminars; and (3) three teachers from one of the observed seminars were interviewed. Four aspects of teacher's perspectives of NIPEP emerged from the data. The practical component of the seminar was really enjoyed by the teachers, and perceived as beneficial; it increased their confidence in teaching the curriculum post program completion. An aim of the program was for teachers to gain a greater understanding of physical education. However, only 25% reported their understanding had been enhanced a lot, with a further 51% indicating that it had been "somewhat" enhanced. Understanding of the curriculum, however, was enhanced "a lot" by 42% of the teachers. The researchers also assessed the intentions of the teachers to expand their physical education programs and to reflect on their teaching and planning in physical education. Seventy four percent of the teachers reported that they would teach elements of strands of physical education that they had not taught prior to NIPEP. The NIPEP showed not to be effective in providing the teachers with an ability to differentiate to meet individual needs (only 60% of the participants indicated that their ability to differentiate instruction had improved and only 40% were enabled to provide for children with special needs). The absence of a control group and the lack of

detail regarding how the samples of teachers, tutors and workshops were selected for study compromises the results of this research. However, there were lessons to be learned. Most notably, providing the teachers with ample time to transfer their learning into their teaching was key for effective PD; this is a component that future PD programs should strive to implement.

Transformative learning theory was again used in a study by Faucette, Nugent, Sallis, and McKenzie (2002) in their design and implementation of a traditional PD program focused on Project SPARK (Sport, Play and Recreation for Kids). This PD involved 16 teachers (1 male, 15 female) participating in 16, two to three hour training sessions over the course of two years. In each session information was provided as to how teachers could implement SPARK and, in alignment with Mezirow's (1991) transformative learning theory, included opportunities for the learners to be involved in critical discussions and self checking of prior beliefs in light of their new knowledge. A mixed method of data collection was utilized. Interviews and questionnaires were used to determine changes in the teachers' perceived knowledge and competence to teach physical education. By the end of year one all participants noted their ability to teach physical education to be better than the previous year and this held true for 10 of the participants by the end of year two. Teachers also perceived their students to benefit from the PD experience. The strength of designing the study around transformative theory was reflected by several participants noting the design and the content of the program to be critical for its success. Similar to Martin, McCaughtry, Kulinna, and Cothran (2008), a lack of randomization is a weakness

of this study. In addition, the lack of a control group and small sample size make generalization of findings difficult.

Two commonalities arise in quality PD in this field: (1) there is a theoretical foundation provided for the design and implementation of the PD program with details provided on how this theory is applied and (2) there is an opportunity for the lessons learned to be applied to the teacher's situation. However, these program strengths are rare in the literature and typically a number of PD program weaknesses are plentiful in the literature: (1) a lack of learner input and decision making into the workshop design and implementation, (2) a lack of a theoretical model underlying the program and (3) a lack of opportunity for practical application of the program's lessons. Such criticisms highlight a negligence of PD designers to consider the characteristics of the adult learner as highlighted by Knowles. Furthermore, research design weaknesses compromise the literature in the field also, as reflected in the studies discussed: (1) a lack of control groups; (2) when control groups are used, randomization is not; (3) sample sizes are generally small; 4) assessment is generally qualitative in nature, and (5) lack of a retention/follow-up assessment to judge the program's long term effect.

## **Reform PD**

In response to the failings of traditional PD programs, a reformed PD format has emerged. Reform PD involves "interactions with teachers around teaching and learning, including conversations about instruction, peer observation and feedback, and advice asking about instruction" (Garet, Porter, Desimone, Birman, & Yoon, 2001, p. 324). Researchers have also defined reform PD as study groups, committees or task forces, individual's research projects and teacher networks, and mentoring relationships (Desimone, 2009, Guskey, 2003). Such PD activities are underpinning by a constructivist theoretical framework (Little & Curry, 2008) whereby the learners are actively involved in the learning process. Due to this active involvement, as well as its school-embedded and longer duration formation, reform PD was suggested to be most effective (Garet et al., 2001). In the field of physical education, Keay's (2006) research focused on a reform PD program that aimed to extend the teachers' views of physical education to include collaborative learning. This challenged the physical educator's narrow view of PD as structured; reflecting that of the traditional workshop. The study involved four cohorts of newly qualified physical educators (exact numbers of teachers were not provided). The study's aim was to introduce the teachers to everyday learning experiences and, specifically, it examined the role of collaborative learning. It involved a longitudinal study of PD experiences, through three stages. Stage 1 consisted of the teachers professional histories being construed for each teachers so as the researcher could make sense of their interpretations of induction, PD and their roles. Stage 2 involved PDs based on case-study methodology; eight teachers were involved in meetings at five points throughout the year, and discussions were recorded. Semi-structured interviews and telephone conversation were also used. Stage 3 involved the researcher confirming their interpretation of the teacher's PD experiences. The teachers acknowledged the benefits of the collaborative learning opportunities. The

absence of some key information made this study unreplicable. These method issues included a lack of reporting on sample sizes, surveys, and most importantly, details on the design of the collaborative learning sessions.

The importance of collaborative learning opportunities was reflected in research by Armour and Yelling (2007). This study involved 10 physical educators keeping diaries on their experiences in PD activities, throughout the year. Participants were also involved in three interviews. Thematic analysis was used to analyze data. Finally, a focus group was conducted so as themes could be confirmed. Participants were asked to report on formal and informal learning experiences throughout one school year. Results revealed that learning from informal collaborations were more effective than other forms of PD. The opportunity to interact with other physical educators (in formal or informal settings) was valued more than traditional PD which was seen by some as a "formality to get through" (Armour & Yelling, 2007, p.190).

The benefits of collaborative learning are evident in the research discussed. Professional learning communities (PCLs) are another example of reform PD that has the potential to engage teachers and allow them to learn from and with each other (Darling-Hammond & McLaughlin, 2011). Patton and Parker (2013) assessed the pedagogical strategies employed by facilitators of PD and, from the perspective of teachers, what strategies contributed to their growth as learners? Fifteen PD facilitators and 88 teachers (that participated in 8 professional learning communities in the US and Europe) participated in the study. PLCs included were teacher-originated, non-mandated groups focused on self-generated problems. Data collection included: (1) formal and focus group interviews, (2) informal conversational interviews, (3) field notes (from observations from 7 of the 8 professional learning communities), and (4) artifacts. Three themes arose that contributed to teachers' growth as learners: (a) learning as doing: providing structure without dictation: this theme included the provision of social and active learning opportunities for the teachers, (b) learning as trying: allowing the teachers to gain, create and test new ideas in their classes, and (c) learning as sharing: teachers involved in public presentation of work to their fellow teachers. These benefits, active application of learning and opportunities for collaboration with other teachers, reflected the strengths revealed in other research on PD in physical education (e.g. Armour & Yelling, 2007). In relation to the pedagogical strategies employed by the facilitators, a number of key elements were consistent across the eight different PDs programs. Effective programs: (1) used teacher learning communities that adhered to the fundamental constructs of effective PLCs; (2) were sustained over time, (3) were social, physically and mentally stimulating, (5) had content that was teacher defined, and most importantly, (6) were all designed to ensure a meaningful and supportive learning environment for the teachers. Such characteristics of PD reflect the principles of andragogy set forth by Knowles. Although the researchers and program facilitators were successful in achieving their aims-- identifying the pedagogical strategies used and determining what strategies were noted by the teachers as contributing to their growth as learners--little information was provided on the actual effects this had on the

participants' teaching or student learning. As improving teacher practices and student learning is the ultimate aim of PD, a failure to address this directly in data collection may have been a missed opportunity.

Examining teacher change through reform PD, McCaughtry, Martin, Kulinna and Cothran (2006) used an emotional geographical framework to highlight the ways that teacher's physical and social culture influences their work and PD experience. The program focused on 15 teachers' adoption and implementation of the EPEC curriculum. Teachers had previously received a traditional PD workshop on EPEC but studies showed that the teachers incorporated little, if any, of the material to their teaching. However, no details were provided as to how this was determined. The program at the heart of this study involved three types of PD: (1) a day long refresher course on EPEC which included lengthy discussions, sample lessons, and introductions to EPEC assessments; (2) teachers were provided with a resource package (including equipment, books, and instructional materials; (3) teachers attended two additional day-long workshops which were teacher focused, with discussions of EPEC and issues of implementation and included demonstration lessons; these workshops were designed around teachers' concerns and perceptions; and finally (4) an EPECexperienced mentor visited each teacher for two half days to provide advice and support. Interview and small group interviews with teachers were the primary method of data collection. The main finding from this study dealth with how the emotional dimensions related to the teacher's students, colleagues and status greatly influenced the impact of, and their engagement with, the project. For

example, the teachers of urban students were very aware of the obesity epidemic that threatened their student's wellbeing; this awareness increased their openness to change. Conversely, amongst some teachers, there was skepticism and anxiety to change due to their comfort with their previous teaching practices. The ability to connect and engage with other teachers was again evident as an important aspect of this PD experience; the teachers benefited, and were motivated by the support received from their peers. The teacher's status within the program was also influential. In this project their role was not only to learn a new curriculum but also to discuss, evaluate, and adapt it to suit their situation. This ownership increased their acceptance of the program. Other factors, influencing engagement and impact, were status of the PD program within the teacher's school and within the district. This research demonstrated the contextual factors influential to teachers participation in PD. Results reflected previous research that revealed how elements such as school culture (Rovegno & Bandhauer, 1997), micro politics of schools (Sparks, 1988), support from colleagues (Faucette and Graham, 1986) and principals (Bechtel & O'Sullivan, 2007), work place conditions (Stroot, Collier, O'Sullivan, & England, 1994), personal and psychological dispositions (Cothran, 2001) and teacher beliefs (Kulinna, Silverman & Keating, 2000) were impactful on delivery and acceptance of PD. Consideration for these aspects of PD implementation has shown to be lacking in the PD of physical educators (Armour & Yelling, 2007).

#### Lessons learned from Physical Education Professional Development

This section involved the review of studies on PD for physical educators. For both traditional and reform PD programs, a number of characteristics defined the effective PD experiences: (1) the social aspect of traditional PD was repeatedly seen as a major contributor to the success of the experience, as revealed by Patton and Parker (2013), Armour and Yelling (2007) and Keay (2006). More specifically, teachers in the study by Armour and Yelling (2007) reported that even when the PD content was not viewed as beneficial, the ability to interact and network with other teachers during the workshop or course was helpful. This would suggest a merging of traditional and reform PD is best; (2) all studies reviewed focused specifically on the content area of physical education (as opposed to general teaching strategies). This characteristic has been noted as being key for effective traditional PD for physical educators (Betchel & O' Sullivan, 2006); (3) PD that provides an opportunity for direct application of the lessons learned was shown to be most beneficial; usually this was achieved by giving teachers time between PD activities to apply knowledge learned to their classes (e.g. Patton & Parker, 2013); (4) reflecting Knowles first principle of the adult learners need for self-direction, teacher's involvement in the PD was another strength evident in much of the research on PD (e.g. Keay, 2006); and finally, (5) effective PD was underpinned by a theoretical framework (e.g. Faucette et al., 2002). Future PD programs should attempt to integrate these characteristics to maximize learning for the teachers.

Future researchers of PD programs should be cognizant of the consistent research design weakness that jeopardize much of the research on PD in physical education: (1) the vast majority of studies fail to utilize a control group; (2) research predominantly focuses on teacher or facilitator perceptions of the PD program, neglecting to assess teacher, or subsequent student, learning; (3) samples sizes are generally small; (4) all but one study (Martin, McCaughtry, Kulinna, & Cothran, 2008) included a retention test to evaluate long term effects of the PD program; and (5) many studies (e.g. Murphy & O'Leary, 2012, Keay, 2006) lack details regarding methodology that make inference of result difficult and replication impossible. It is clear that future PD designers must strive to integrate the characteristics shown to be pertinent to effective PD, while employing a sound methodological design in their evaluation.

### **Online Professional Development**

Due to the high price in resources and time, as well as the teachers' overburdened schedule, alternative forms of PD must also be considered. This realization has led to PD being increasingly offered online (Dede, Jass Ketelhut, Whitehouse, Breit, & McCloskey, 2008). This section provided an overview of online learning and a review of its use and evaluation for teacher PD.

## **Defining online learning**

Online learning, a form of distant education, is defined as education that is accessed using technological tools that are either web-based, web-distributed, or web capable (Nicholas, 2003). There is discrepancy in the literature amongst definitions of the characteristics of this term, resulting in the evolution of a broad term inclusive of, and often synonymous with, terms such as online courses/programs, web-based learning, web-based training, learning objects, multimedia learning, technology-enhanced learning, and computer-based instruction (Moore, Dickson-Deane, & Galyen, 2011). Despite this discrepancy and inconsistency in the definition of online learning, literature predominantly agrees on a plethora of benefits it offers the learner and teacher (Valian & Emami, 2013). Online learning offers greater flexibility than traditional face-toface teaching; the learner can adapt online course work to fit their schedules and preferences. Online learning may also save time and money for the learner; the time and cost of commuting is eliminated and tuition costs are often lower. Logistical advantages emerge also as the restrictions associated with traditional education (e.g. paucity of space in classrooms and dependency on local resources, such as facilities, are overcome) (Valian & Emami, 2013).

#### **Comparison studies: apples to oranges?**

Many studies have sought to examine the effectiveness of online learning in comparison to face-to-face learning. Yet learning environments, including PD, are not monolithic. The great variety between formats, contexts, student characteristics, instructor characteristics, and an array of other variables often contribute to making comparisons difficult. Being cognizant of this, the following examination of comparison research should be read with skepticism.

A meta-analysis (Bernard et al., 2004) examined the results of over 200 comparison studies. The result of comparing overall weighted mean effect size of student achievement showed no significant difference between the two. A

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literature review by Tallent-Runnels and colleagues (2006), reviewing 76 studies, reflected this lack of difference in student achievement between online learning and face-to-face education. A more recent meta-analysis (Means, Toyama, Murphy, Bakia, & Jones, 2009) involving an analysis of 51 studies also compared online learning to face-to-face instruction. Results revealed more favorable outcomes for online learning with an overall finding that, on average, it produced stronger student outcomes than classes with solely face-to-face instruction. Such results have led many to researchers concluding that there are no significant differences between online or face-to-face learning for student achievements, or that online learning education may be better (Dell, Low, & Wilker, 2010). However, as aforementioned, one must interpret the results with a great degree of caution. Several issues compromise the usefulness of comparison studies: (1) as alluded to previously, definitions of online learning differ greatly between, and within, these meta-analysis'. For example the metaanalysis by Mean et al. (2009) included blended learning in its definition of distant education; (2) many studies failed to equate important elements of the learning environment such as curriculum materials, aspects of pedagogy and learning time, often arguing the it was sometimes impossible (Means et al., (2009). The inability to control such influential characteristics may render comparisons ineffectual as the observed advantage for one learning environment may be rooted in differences in these important learning characteristics as opposed to the environment itself; and (3) although the aforementioned metaanalysis included studies with an experimental and quasi-experimental design,

several methodological weakness remain that jeopardize results (e.g. small samples sizes, unreported retention rates [particularly for the control comparison condition], and a recurring potential bias exists in studies due to the authors' role as both experimenter and instructor). Such issues make comparison studies contentious. Although a call for future comparison research with better design, analysis and reporting was echoed throughout literature reviewing comparison studies (Bernard et al. 2004; Mean et al, 2009; Tallent-Runnels, et al., 2006), a call for research to determine the effectiveness of professional development formats, based on their own merits, may be more beneficial and trustworthy.

### **Disadvantages of online learning**

Online learning is certainly not without its critics. The technopositivist ideology, or the "compulsive enthusiasm" for online learning in education, has been criticized for the efforts to advance online learning while neglecting the needs of the learner (Njenga & Fourie, 2010, p. 199). This predominately occurs due to an acceptance of online learning as the answer to educational problems based on myth and assumptions (Njenga, & Fourie, 2010, p. 199). Njenga & Fourie (2010) presented some of the myths that proponents of online learning should consider. For example, the authors noted that online learning was not the answer for all educational problems in all situations. Success from one online learning venture did not guarantee success in another. The ability of online learning to replace human interaction, without detriment to the learner, was another myth debunked by Njenga and Fourie, as they argued that the teachers in online learning was limited in the number of students they can adequately support. Finally, online learning has been hailed as a means to decrease absenteeism and lower drop-out rates (for example, Loxley & Julien, 2004); however, there is a severe dearth of research to support this. Indeed some research actually showed that it was the academically stronger students that benefited most from online learning (Stanz & Fourie, 2002) and studies have shown attrition to be greater in online learning courses in comparison to face-toface. For example, a study by Levy (2007) involving 453 students revealed how online learning courses had a dropout rate of 18% compared to 8% of the traditional format course. Research on perspectives of the learner and teacher of online courses versus face-to-face also regularly demonstrated a more favorable attitude to the traditional education format (Guri-Rosenblit, 2005). Such literature highlights the gap between rhetoric in the literature and the actual implementation.

### Use of online learning in higher education

Unsurprisingly, considering the benefits, and perhaps upsettingly, considering the perils, postsecondary educational institutions' utilization of online education is growing rapidly. Total postsecondary enrolment in traditional courses declined as of Fall 2011 (Allen & Seaman, 2013) while online enrolment continued to increase (Martin, 2013). As of February, 2013, there are more than 40 million online higher education students in the world that take one or more classes online (Adkins, 2013). In the U.S. alone, it was estimated that by 2017, 24.5 million higher education students will take one or more of their classes online, with 4.4 million of these students predicted to be taking all classes online by 2017 (Adkins, 2013). This evolution of postsecondary education is reflected in the 70% of higher education institutions viewing online education as vital to long term plans (Allen & Seaman, 2013). With these predictions in mind, it is unsurprising that teacher PD is increasingly being offered online also. **Use of online learning in teacher Professional Development** 

Online learning has also shown to be an effective means to deliver PD. Indeed, the need for innovative scalable PD delivery methods has become increasingly important as the need for PD programs grows, often demanded by educational legislation. PD, considered by many as the keystone to educational improvement (Hawley & Valli, 1999), comes at a high price in resources and time and adds to teacher's already overburdened schedules (Dede, Jass Ketelhut, Whitehouse, Breit, & McCloskey, 2008). To overcome such challenges and continue to allow teachers to keep abreast of emerging knowledge and refine their conceptual and craft skills to become more competent (Guskey, 2000), online teacher PD programs are increasingly being created (Dede et al., 2008). These courses are now providing education to teachers in an array of areas (e.g. introducing new curricula, altering teachers' beliefs and instructional and assessment practices, changing school organization and culture, and enhancing relationships between school and community) (Dede et al., 2008). These courses are available to teachers at their convenience, can provide just-in-time assistance, give schools access to experts and resources otherwise unavailable, and are more scalable than PD's dependent on local resources or non-online

training (Dede et al., 2008). Quality research on the effectiveness of these courses has, however, been infrequent. This was reflected in a meta-analytic review (Scher & O'Reilly, 2009) of studies that used a quasi-experimental or experimental design which involved PD in math or science using teacher attitudes, teacher practice, student attitudes or student learning as a dependent variable. Only 18 studies met the researcher's criteria and only one used a randomized experiment. In response to this scarcity of quality research, there has been a call for experimental studies that directly document teacher learning, classroom practice, or student learning (Desimone, 2009). In this section a number of such studies will be examined that exemplify quality research in this area.

Masters, Magidin deKramer, O'Dwyer, Dash and Russell (2010) used a randomized controlled trial to study an online PD (OPD) program's effect on the knowledge and instructional practices of fourth grade English language teachers. Two hundred and fifty-five teachers were randomized between a control and experimental group. The control group was not offered the OPD course, but was not restricted from received alternative forms of PD. The experimental group participated in three OPD courses, each completed within seven weeks. Each course required approximately four to six hours of participation per week of the course. The PD used a learning-community model of online learning, which combined independent readings and activities with facilitated peer-to-peer discussions. Readings involved articles, book chapters or reports, and activities included viewing online videos or use classroom materials. The course was

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focused on best practices for vocabulary instruction, prompting reading skills and methods for teaching writing in the elementary classroom. Data collection included a content knowledge test completed by participants' prior to and after course completion. This content knowledge test was designed to measure content specific to each OPD workshops and included a mix of closed and openquestions. Participants in the experimental groups also self reported on their practice of the skills learned during the OPD, i.e. instructional strategies. To assess teacher instructional behavior, practice items were included in the survey. These consisted of scales reported the frequency of desirable instructional practices. For example, to assess the teachers' use of small groups for vocabulary discussion activities, the statement posed was: "when reading in the classroom, my students and I discuss vocabulary words in small groups." Teachers responded on a four-point scale with options of "always; frequently; sometimes; and rarely." Each survey was independently developed and reviewed by the workshop developers for accuracy of content. Reliability was also calculated and all surveys were deemed to be at an acceptable level. A one-way analysis of covariance (ANCOVA) was conducted with group membership (treatment or control) as the independent variable, post-test scores as the dependent variable, and pre-survey scores as the covariate. This was completed after teacher's pretest scores were adjusted for measurement error or unreliability. The results showed a significant increase in the experimental groups knowledge from pre to post-test, in comparison to the control group for all workshop contents areas and overall improvement (b = .13, df = 1,107, p < .001) with a large effect size for

reading comprehension and writing knowledge and total knowledge. Conversely, there was a small effect size for teacher's vocabulary knowledge scores. A similar method of analysis was conducted with the practice items, and again practice scores for all workshop areas, with large effect sizes for all content areas, except for reading comprehension which was in the medium range. Although positive results, a number of issues should be noted. First, drop out affected both groups of participants; 42 teachers did not complete the requirements of the control groups and 115 teachers did not complete all requirements of the treatment groups. This raises the question of why did teachers drop out and how was the resulted sample biased. In addition, the self report dependent variable could be improved upon by included additional data for triangulation purposes. An assessment of student learning would also have been beneficial.

Assessment of student learning was one of the dependent variables used by Fisher, Schumaker, Culbertson and Deshler (2010) which used a randomized controlled trial design to examine teacher learning to use a concept mapping technique to support student learning. Eight teachers were randomly assigned to a virtual or face-to-face workshop; four teachers per group. Although a low number of teachers participated in the study, the higher number of students (n = 125) deemed it a worthwhile study for examination. The virtual workshop, delivered through two compact discs, involved the coordinated use of text, video, audio, and animated graphics. Disc one instructed the teachers regarding use of concept mapping. Disc two was a classroom simulator; through the coordinated use of multimedia, teachers were guided through the application of the routine, which allowed them to access a lesson plan, interact with virtual students, receive support from a virtual coach, and record information on a virtual Concept Diagram. The face-to-face workshop mirrored the content of the virtual workshop. The PD was conducted in two sessions. Post workshop completion, teachers were observed in a class as they used the strategy of concept mapping. An observational checklist was used to assess the teacher's instruction, prior to and after the PD was completed, evaluating 39 teacher behaviors. There was found to be no significant difference between control and experimental group. Due to the small sample size, a multiple-baseline across-teachers design was employed and implementation scores were graphed for visual analysis. Results showed a substantial greater number of the targeting instructional behaviors were practiced post PD completion for both groups; for the online PD group, however, the average implementation scores were greater, at 88.51%, in comparison to the mean post-score for the face-to-face group which was 72.2%; this was despite similar pre-scores of 1.85% and 1.79% respectively. An 85.40% inter-rater reliability for the implementation score was also calculated. To assess student learning a concept acquisition test was administered to students after the teacher had taught them about a specific concept; this was first done before the teacher completed the PD and again after the PD was completed. An ANCOVA, comparing the aggregated classroom means of the student groups, with post-test scores serving as the dependent variable and pre-test scores as the covariate, showed there to be no significant difference between the post-test scores for students who participate in the online and face-to-face PD F(1,7) = .03,

p = .606. Finally, a questionnaire was completed by the students relating to their satisfaction with the teacher's use of the CMR. The 11 items on the questionnaire, consisting of Likert scales, focused on the students' satisfaction with a variety of components of the lessons; student rated each item from extremely satisfied (7) to extremely dissatisfied (1). ANOVA's revealed no significant difference between the satisfaction scores of each student group for each item. Due to the small sample of teachers used, implementation data should be interpreted with great caution. However, this study served to demonstrate how teachers' application of learning can be assessed. In addition, the study's assessment of students learning was a defining factor that sets this study apart for the majority of studies in this field.

Also assessing teacher and student outcomes, but with much larger samples, Powell, Diamond, Burchinal, and Koeler (2010) examined the effectiveness of a literacy-focused PD intervention involving expert coaching with Head Start teachers. Eighty-eight teachers participated in the study and were randomly assigned to an intervention semester (Spring or Fall) and a participation year (first or second). Teachers were then randomly assigned to one of two PD groups: on-site (face-to-face) PD or remote coaching (online) PD. In year one of the study, one random half of the teachers who were assigned to the spring interventions semester were put in the control group in the Fall semester. In year two of the study, all teachers assigned to the Spring intervention semester served as the control group in the Fall semester. In summary, two sets of randomized trial comparisons of a one semester PD interventions were conducted. Eighty eight teachers and 759 students participated in the study. The aim of the PD intervention, titled *Classroom Links* to Early Literacy, was to improve teachers' use of evidence-based literacy instruction. It was hypothesized that this would in turn lead to significant improvements in children's literacy achievement. Both PD interventions began with a two-day workshop providing them with an overview of the intervention content, demonstration, and guided discussion. This was followed by the expert coaching component of the workshop which was done face-to-face or online. The main purpose of this section of the PD was to provide individualized feedback to teachers to improve their implementation of evidence based practices emphasized in the intervention. This comprised of an observe-assessrecommend format. For the face-to-face PD group, teachers were observed and then met with their coach. For on online group, teachers submitted a video tape for the coach to review and feedback was given electronically. To assess the teachers' instructional practices, two types of data were collected. First, teachers were observed and scored on a set of dichotomous items relating to instructional behaviors' and second, teachers were audio-recorded as they read to their students (an average time of 8.96 minutes). After transcription of audio recordings, they were coded and scores given for use of instructional practices related to the number of language-eliciting prompts and number of simple definitions of words. A 90% reliability inter-observer score was achieved after training before data collection occurred. In addition to assessment of teachers' practices, the students learning was also assessed, pre and post PD completion,

using the Peabody Picture Vocabulary Test (PPVT-III). Hierarchical linear model analyses were employed to compare the intervention and control groups. Child race-ethnicity and gender were included as covariates. In addition, group equivalence was examined prior to data analysis and indicated that no significant differences existed between groups for factors such as degree held, years of teaching experience and teacher background characteristics. Priori contrasts for teachers and student outcome variables, between groups assigned to face-to-face or online PD revealed that an inconsistent pattern emerged. Teachers in the faceto-face groups demonstrated significantly greater gains in code-focused instruction, than the group who received coaching online (d = .71) and had higher scores on code-focused instruction (d = .67). Conversely, students whose teachers received remote coaching showed larger gains on the PPVT-III (d = .13). The use of a randomized experimental design and the assessment of teachers and students was a major strength of this research. However, a limitation to the study, and one that resonates throughout the literature in this field, is that teachers volunteered to participate in the PD programs on offer; they were not compulsory programs that teachers were required to complete. This limits generalizability of findings. In addition, although the use of teacher video recordings was an innovative means of data collection used in this study, it did allowed for teachers (with an inherent bias to perform well for the coaches) to select the most effective time to video record themselves. Perhaps the video clips seen, and assessed by the researchers, were not reflective of typical classroom practice.

Videos were also used for data collection in a study by Fishman,

Konstantopoulos, Kubitskey, Vath, Park, Johnson, and Edelson (2013); however, in contrast to Powell et al. (2010) this was employed for both experimental and control groups. The study involved the evaluation of face-to-face versus online PD to prepare high school teachers to implement a year long environmental science curriculum which involved a pedagogical approach called learning-foruse. Forty-nine teachers, from across the US, were randomly assigned to either a face-to-face or online condition (n = 24 face-to-face, n = 25 online). The face-toface condition involved a week long (48 hour) workshop spread over 6 days. Little detail was provided about the nature of this workshop. The online condition was an online workshop that teachers completed asynchronously. It involved a series of self-paced short-courses with a facilitator guiding teachers and answering questions as the teachers worked though the materials. A discussion forum was also open to the participants, but they were not encouraged, nor discouraged, to use it. Each group had the same "opportunities to learn" with the same information being made available to all participants (Fishman et al, 2013). A variety of data collection methods were employed: (1) a 25 item environmental science knowledge test; (2) teacher's self efficacy for teaching environmental science--assessed using a modified version of the Science Teacher Efficacy Beliefs Instrument; and (3) teachers' feelings of preparedness teaching environmental science. These measures were administered to both groups prior to PD and again after the teachers had concluded teaching the curriculum. To assess the teachers' application of the PD

lessons, teachers were asked to video record lessons. This allowed for comparisons to be made between practice and content. Videos were scored with rubrics. Finally, student learning was assessed using a 29-item multiple-choice item of environmental science content knowledge with a high content validity to the curriculum. Teachers administered the tests prior to the beginning of instruction and then again immediately afterwards. Findings showed significant gains for teachers and students in both conditions, with no significant differences between groups. A number of factors should be considered when interpreting these results. First, the online group did participate in a two day face-to-face "orientation" session; technically, this would lead to the online PD being considered a blended learning workshop. Second, the contact hours for learners differed greatly; whereas for the face-to-face learners, the contact hours were 48 hours for all participants, for those participating in the online workshop, contact hours varied from 3 hours to 58 hours. While, the ability of online learning for flexibility of pacing for learning was certainly an affordance of online learning, it made generalizing findings problematic.

As seen in the studies reviewed in this section, online PD does show to hold great potential for the improvement of teacher practices and student learning. A number of studies utilizing a randomized experimental design exemplify these benefits. Evaluation of PD effectiveness is a contentious issues with a number of different methodologies being employed; teacher knowledge tests (Masters et al., 2010), student learning tests (Fisher et al., 2010), teacher observation, including video recordings (Powell et al., 2010), teacher and student satisfaction assessment (Fisher et al., 2010) and self reported "frequency of desirable instructional practices" (Masters, 2010). However, the absence of theoretical foundations for the PD programs being studied is a critical weakness that future research should overcome. As well as knowing *what* works, it is essential that we also know *why.* This knowledge would allow for results to be replicated in research and in practice. Without a solid and detailed theoretical underpinning, the diversity in models of online and face-to-face PD makes comparisons futile. Future research must seek to address this.

### **Instructional Design**

In addition to incorporating principles from adult learning theory and principles of effective PD into the design and delivery of teacher education programs, principles of instructional design must also be considered. Instructional design involves using learning theory to create specifications for the development and implementation of learning experiences, materials, and environments (Whitmyer, 1999). However, while there has been widespread advocacy for theory based cognitive learning (Ally, 2008; Anderson, 2004; Miller & Miller, 2000; Richey & Klein, 2007), there exists a severe dearth of literature demonstrating this. Instead, the design of online learning is largely designed "though unchallenged tradition" with theory-based design substituted by "artistic tactics and craft-based solutions" (Richey & Klein, 2007).

Derived from cognitive learning theory, the cognitive load theory (Chandler & Sweeler, 1991) and the dual processing theory (Paivio, 1986; Bagui, 1998) provide us with an understanding of the complexity of information processing and *should* provide the basis for online learning design. The cognitive load theory states that we possess a finite amount of working memory; when we overload this working memory with information and interactions that require simultaneous processing, learning cannot occur. The dual processing theory holds that there is two ways to internalize information: through visual and auditory channels; in working memory these are combined. Both visual and verbal codes can be used when recalling information (Sternberg, 2003).

# **Cognitive theory of multimedia learning**

Both the cognitive load theory and the dual processing theory form the basis for Mayer's (2001) cognitive theory of multimedia learning which provides for an empirically validated design process. This theory has three assumptions: (a) Humans possess two separate channels for processing visual and auditory information; (b) Humans are limited in the amount of information that they can process in each channel at one time; and (c) 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 (Mayer, Dow & Mayer, 2003, p. 63). In response to these assumptions of the learner, three elements are required, each essential to the science of instruction (DeLeeuw & Mayer, 2008, p. 262). The instructional designer must (a) reduce extraneous processing; cognitive processing that does not support the instructional goal and is attributable to confusing instructional design; (b) managing essential processing; cognitive processing needed to mentally represent the incoming material and that is attributable to the complexity of the material; and (c) fostering generative processing; cognitive processing aimed at making sense of the incoming material, including organizing it and integrating it with prior knowledge (Mayer & Jackson, 2005; Sweller, 1999). To further aid the designer in applying these elements, Mayer outlines 10 research-validated design principles. However, in this section as well as outlining these design principles, the reader will be alerted to the weakness of research design that Mayer used to validate these design principles. The section will conclude with an examination of more recent, methodologically sound research that has since been conducted, which provides evidence of the effectiveness of these principles.

#### **Reducing extraneous load**

The need for extraneous processing is deemed to be the most serious critique of ineffective multimedia lessons (DeLeeuw & Mayers, 2008). To overcome excessive and irrelevant extraneous processing, five instructional methods are presented. The coherence principle states that individuals learn better when extraneous material is excluded. An individual's processing capacity should only attend to material essential for the learning goals. The principle of signaling involves the highlighting of the essential material in the lesson; it may include the use of an overview at the start of a lesson, using headings throughout the lesson, and emphasizing main ideas throughout the lesson. The third principle to prevent extraneous processing is the redundancy principle. This states that it is more effective to present the learner with narration and visuals only, as opposed to the addition of on-screen text also. On-screen text creates extraneous learning

which reduces the learning that occurs. In addition to the inclusion of too extraneous content, the layout of the screen can also result in extraneous processing. Two principles are provided by Mayer to address this issue: the spatial contiguity principle states that information shown in pictures and words should be presented close together to prevent the need for scanning of the screen. Lastly, the principle of temporal contiguity refers to the need for instruction to take advantage of the learners' ability to have corresponding words and images in working memory at the same time; therefore, if you are to present the same information it should be presented simultaneously, as opposed to in succession. Mayer and colleagues (Stull & Mayer, 2007, Harp & Mayer, 1997; Harp & Mayer, 1998; Mayer, Bove, Bryman, Mars, & Tapangco, 1996; Mayer, Heiser, & Lonn, 2001; Mayer & Jackson, 2005; Moreno & Mayer, 2000a) demonstrated the impact of applying these principles in experiments involving computer-based lessons on lightening, ocean waves, braking system of cars and lungs. With extraneous processing reduced, participants showed to perform significantly better with a medium and large effect sizes.

#### Managing essential processing

The second element key to effective instruction is of managing essential processing; preventing the demands posed by the essential processing from overwhelming the learners (DeLeeuq &Mayers, 2008). Three principles are offered to assist the instructional designer to achieve this. First, the principle of segmented relates to breaking large portions of material into smaller digestible chunks. Experiments have shown material presented in segments to be learned

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more effectively, than when presented continuously. The second principle for this element, is pretraining; it involves orienting messages to introduce the content prior to the lessons; for example it may involve definitions of important terms to be used. Research showed pretrained learners to outperform learners who were without pretraining. Finally, the modality principle also aids the instructional designer to manage essential processing. This principle states that the learner processed information better from graphics with spoken text as opposed to graphics with printed text. This is due to the learners being forced to split attention whilst interpreting the text and graphic, overloading the visual channel (DeLeeuw & Mayer, 2008). This was demonstrated in research (Harskamp, Mayer, Suhre, & Jansma, 2007; Mayer & Chandler, 2001; Mayer, Dow, & Mayer, 2003; Mayer, Mathias, & Wetzell, 2002; Mayer & Moreno, 1998; Moreno & Mayer, 1999; Moreno & Mayer, 2002; Moreno, Mayer, Spires, & Lester, 2001) involving education in environmental science, biology and electric motors. Learning was significantly greater, with large effect sizes, for groups where essential processing was controlled in the presentation of content.

#### **Fostering generative processing**

The final element of Mayer's triarchic model of cognitive load is the need for fostering generative processing. Thus far, the researcher has discussed how to reduce extraneous processing and to manage essential processing; if this is done successfully the learner will have maximum cognitive capacity available for generative processing (DeLeeuw & Mayer, 2008). Mayer offers two principles for addressing this; first designers should apply the multimedia principle; this relates to individuals learning better from words and pictures, rather than from words alone. This occurs due a deeper learning occurring as a result of simultaneous representation of content in voice and graphic. The second principle relating to generative processing is the personalization principle; individuals learn better when information is presented in a conversational style rather than a formal style. This is due to the creation of a "social partnership" (DeLeeuw & Mayer, 2008) which increases motivation for the learner to attend to the information being presented. When both principles are applied, learning has shown to be significantly greater for learners, with a large effect size, as shown in experiments which presented learners with content related to lungs, lightening, botany and industrial engineering (Mayer, 1989; Mayer et al., 1996; Mayer & Anderson, 1991; Mayer & Anderson, 1992; Mayer, Fennell, Farmer, & Campbell, 2004; Mayer & Gallini, 1990; Moreno & Mayer, 1999; Moreno & Mayer, 2000; Moreno & Mayer, 2004; Wang et al., 2008).

A number of design flaws limited the usefulness of these studies deemed to validate these instructional principles. First, and most glaringly, Mayer was involved in the implementation of all studies; the involvement of the individual who devised the cognitive theory of multimedia learning in research studies that assessed its validity posed questions regarding researcher bias. Second, participants of these studies were drawn from the psychology subject pool at the University of California. This limited the generalizability of findings and, due to the researcher's involvement within the psychology department and therefore having potential authority over the students, may be further cause for bias in the
study. Small samples sizes also limited the generalizability of findings. For example Moreno and Mayer (2004) involved just 12 participants in each group and Mayer and Anderson's (1992) study involved just 15 participants per group. Such low sample sizes reflected the number used in all studies. Furthermore a failure to assess retentions lessened the usefulness of these studies.

To overcome the questionable research methods used in the validation of Mayer's principles, and to determine their usefulness for the planned study, it is necessary to examine more recent work assessing their application to online learning. Research conducted on the use of podcasting for instructing learners is one way the principles provided by Mayer have been assessed and empiricallysupport provided.

Podcasts have evolved from the audio only versions to "enhanced podcasts" which contain multimedia information, such as slides, pictures, images, photographs, short videos, and chapters that help users to increase their perception about the topic (Femandez, Simo, & Sallan, 2009). However, despite their prevalent use (Kennedy, Thomas, Aronin, Newton, & Lloyd, 2014), their validity as an effective instructional tool is questionable (Hew & Cheung, 2013). Research has shown podcasts to provide learners with a satisfying experiences (Evans, 2008; Fernandez, Simo, & Sallan, 2009; Lin, Zimmer, & Lee, 2013; O'Bannon, Lubke, Beard, & Britt, 2011; Wu, Wu, Chen, Kao, Lin, & Huang, 2012). However there is a dearth of quality empirical evidence for learning (Kennedy, Thomas, Aronin, Newton, & Lloyd, 2014): for example, Heilison (2010) revealed that out of 10 studies on learning using podcasts, only 3 utilized an experimental and control group. In addition, reviews of literature on podcasting (Heilesen, 2010; Hew, 2009) showed that there was a general lack of quality—or lack of information to demonstrate quality—of the theoretical basis for the instructional design. In response to the criticisms of some poorly designed podcast formats (for example as identified by reviews of literature Heilesen, 2010; Hew, 2009), Kennedy (2011) built Content Acquisition Podcasts (CAPs). These podcasts involve a syncing of still pictures, on screen text and audio recording for online broadcast for the elearner (Kennedy, 2012). Most importantly, CAPs are deeply rooted in Mayer's cognitive theory of multimedia learning, and their instructional design features reflect the principles suggested by Mayer. Over the last several years, research has supporting the effectiveness of their use in preservice teacher education has grown. Kennedy, Hart and Kellems (2011) assessed the use of CAPs to provide preservice teachers with knowledge about the inclusion of students with disabilities in general education classroom. The students (n = 79) were randomly assigned to one of two conditions; audio podcast or the enhanced podcast (rooted in Mayer's design principles). The ability of the student to recall knowledge and conduct higher order application of the knowledge was assessed pre and post podcast completion. Independent ttests revealed that students who watched CAPS scored significantly higher on recall of the information presented than the sample randomly assigned to a group that received audio only (t[77] = -2.86, p < .01, d = .64.). Difference in transfer were not statistically significantly t(77) = -1.51, p = .15, d = .34. The lack of a retention test limited the ability to conclude on long term learning benefits.

Future studies should address this. In addition, another limitation, acknowledged by the researchers, was that the sample were all derived from the same class in the same university. Generalizability of results to other types of learners should be made with great caution.

Another study by Kennedy and Thomas (2012) examined the effectiveness of CAPs to teach preservice teachers in the use of behavioral supports, specifically the use of a supportive framework titled *Schoolwide* Positive Behavioral Interventions and Supports (SW-PBIS). An experimental, two group pre-test-post-test-maintenance design was utilized to compare the effect of CAPS in comparison to the use of traditional textbook reading. Students (n =164), from two universities, were randomly assigned to a group who watched a CAP on SW-PBIS (7.25 minutes in duration) or a group who read a from a textbook chapter SW-PBIS. Learners in the CAP group were only allowed to watch the CAP once. Learners in the textbook group could read the chapter as many times as they wished and were encouraged to take notes. An 18-item content knowledge test created to assess learning; however, after the pre-test it was observed that two questions were too easy with over 80s of participants answering it correctly. It was therefore removed, resulting in a final questionnaire of 16 items. The test was administered to participants prior to and post intervention and then again after a period of retention. At pre-test there was no significant difference observed between groups. An ANOVA indicated that there was a significant effect between time and group, Wilk's  $\lambda$  = .89, f(1, 144) = 17.55, p < .000, multivariate  $n^{2-}$  = .11. This suggested 11% of the variance in the

model was attributed to the interaction between time and group. An independent samples t-test, used to identify differences from the ANOVA was conducted with the alpha level set at .025. Students in the CAP group were shown to significantly outperform students in the textbook group, t(121) = 5.91, p < .000, d = .98. Retention of learning was assessed separately for students at each of the two universities. At university 1 retention was assessed 2 weeks after the experiment, revealing that the students in the CAP group outperformed students in the textbook group, t (66) = 4.03, p < .000, d = .97. The students in university 2 completed the retention test during the last week of semester. Although students in the CAP group did outperform students in the textbook group, this difference was not significant (t[76] = .990, p < .325, d = .22). This could be perhaps due to students participating in other class activities, such as reading textbooks and articles, which removed experimental control and created confounding factors. Similar to Kennedy (2011), a convenience sample of students was again used, albeit this time from two different universities. In addition, the learner's ability to apply the learning was not assessed. An increase in knowledge, does not equate to an increase in ability, nor the motivation, to apply it to the classroom setting. Future research should address this.

To further assess the potential of CAPs for preservice teacher preparation, research has examined their potential when paired with reading material (Kennedy, Ely, Thomas, Pullen, Newton, Ashworth, Cole & Lovelace, 2012). Utilizing three groups: (a) CAPs used prior to reading; (b) CAP used post reading; and (c) just reading with graphic outliners alone; both groups in the CAP groups scored significantly higher than the reading-only group. Finally, research (Ely, Pullen, Kennedy, Hirsch, 2014) has also shown the use of CAPs paired with video, to result in the experimental group significantly outperforming the control group, who received reading material only, on content knowledge test on a vocabulary intervention for students with learning disabilities. The potential of CAPs is clear and the sound theoretical foundation upon which they are designed is effective in transferring knowledge to students. Research has yet to examine how this increased knowledge transfer to changes in teaching behavior and student achievement.

#### **Choosing PD content: Strategies that work**

Desimone (2009) indicated that choice of content was a critical feature of professional development. However, despite the wealth of research on professional development, little attention has been given to the content (Garet et al., 2001). With this in mind, prior to choosing course content for the OPD that is the focus of this research, it is necessary to delineate the strategies deemed to be most effective for physical educators to use to include students with disabilities. A review of the literature revealed only six strategies that have empirical support in increasing learning for students with disabilities in physical education.

Paraprofessionals can provide support to the physical educator by fulfilling roles such as tutoring, preparing instructional materials and collaborating with teachers (Auxter, Pyfer, Zittel, & Roth, 2010). Due to their close (often one-to-one) working relationship with the student, they can develop an excellent insight into the needs and interests of their students (Block, 2007). Despite claims that they are in a position to provide instruction to students with disabilities in physical education (Horton, 2001), only one study provides testament to this (Muruta & Jansma, 1997). This study examined the effect of paraprofessionals and peer tutors on the learning and activity of students with multiple disabilities in PE. Results showed support for paraprofessionals to be effective, when trained and coupled with trained peer tutors. Unfortunately, other research (Harvey & Oliver, 2007) found that only 16% of paraprofessionals receive training in PE. It is clear that additional research is warranted on the effectiveness of paraprofessionals. Professional development in this area could focus on effective collaboration with paraprofessional or training of paraprofessionals.

Research (Block & Zeman, 1996, Vogler, Koranda & Ramance, 2000) also demonstrated the effect of adapted physical education professionals on the success of students with disabilities in physical education. Fulfilling roles including providing direct instruction to the students with disabilities and consultation with the PE teacher, the support from the APE professional was seen have a positive effect on the inclusion of students with disabilities. Block & Zeman (1996) demonstrated how an APE professional, working one on one with three students with moderate to severe disabilities, and providing consultation the PE teacher, could provide adequate support for the inclusion of the three students. Vogler, et al. 2000) conducted a case study with one student with a severe physical disability which showed how an APE specialist providing one-toone instruction over an 18 week period could provide support for inclusion in physical education. The small sample size, and presence of other supports in conjunction with the APE specialist (for example paraprofessionals) make generalization difficult. Further research on APE specialist support is imperative. Online professional development for the physical educator related to this strategy may include methods of collaboration with the APE professional.

Combining the strategies discussed previously, a collaborative team model has also shown to improve the effectiveness of inclusion in physical education (Heikinaro-Johansson, Sherrill, French and Huuhka, 1995). In this evaluative case study the team, consisting of the PE teacher, an APE consultant, the classroom teacher and paraprofessional cooperated to successfully include the student with a disability. Result showed all team members and the student benefitted. Again, professional development in this area could focus on how to create a collaborative team or how to effectively collaborate within a team of professionals.

Embedded instruction involves the teaching of skills in the general PE class through systematic instruction during natural opportunities (Hunt & McDonnell, 2007). Valentini and Rudisill (2004) examined its effectiveness in physical education. Using a non-equivalent pre-test-post-test design, the authors revealed that the group (19 students with an intellectual disability and 31 students without disabilities) who received embedded instruction—in this case in the form of an inclusive mastery climate intervention (Ames, 1992; Valentini, 1997, 1999)—demonstrated significant improvements on the Test of Gross Motor Development, in comparison to the control group (17 students with

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intellectual disabilities and 37 students without disabilities). Professional development on this topic may focus on the steps in implementing an inclusive mastery climate intervention.

Cooperative learning involves students working together to maximize their own and each other's learning (Johnson & Holubec, 1993). A case study involving one student with cerebral palsy—showed that cooperative learning may also be an effective means of improving socialization within an inclusive physical education class (Grenier, 2006). Collected data from interviews, observations, and analysis of the teacher's journal were thematically analyzed to reveal that cooperative learning used over a six-month period encouraged students to interact with each other and take responsibility for their learning. In addition, use of cooperative learning resulted in an increase in the teacher's ability to recognize and accommodate individual differences. Further research with additional students and assessing motor skills development should be conducted. Nevertheless, professional development on the implementation of cooperative learning may benefit physical educators in creating a more inclusive environment. A major concern for the aforementioned strategies is the scarcity and out-datedness of studies conducted to support each strategy, and to the small samples sizes used. In addition, the strategies such as using paraprofessionals, APE specialists or a collaborative team approach are dependent on personnel that may not be available to all PE teachers.

Peer tutoring emerges as the strategy with the most empirical evidence for its effectiveness in physical education (see Block, Klavina & Davis [in press] for a full review). Most recently, Ayvazo and Aljadeff-Abergel (2014) examined the effects of classwide peer tutoring in a third-grade class (n = 41) and in an eight-grade class (n = 30). Training was completed by all students prior to the commencement of the program; training was completed over three classes and consisted of an explanation of tutoring behaviors, demonstrated examples and nonexamples of tutoring techniques, and practice using scenarios or role playing. The peer tutoring program followed a consistent routine. First, the teacher explained and modeled each of the class's foci, emphasizing the required critical elements. This was followed by students practicing for two minutes and switched roles (tutor-tutee) at half-time. During the practice students recorded information on their peers practice trial using a performance sheet. If the peer performed 3 consecutive incorrect trials, the tutor was asked to demonstrate the task again. Survey based responses revealed that the majority of students (87%) at third grade and 64% at eight grade) enjoyed the program. Ninety seven percent of the third graders wished to participate in classwide peer tutoring in the future. However, 73% of eight graders did not wish to participate in this class format again, citing the repetitive content and routine in all lessons as well as a preference for small group work as the primary reasons. In another study, Klavina, Jerlinder, Kristen, Hammar & Soulie (2013) used a multiple case study to assess the effect of peer tutoring on the interaction behaviors within students with moderate physical and mild cognitive disabilities (n = 4) and their peers across three elementary school. During the course of the peer tutoring program quantitative and qualitative data was collected. Forty-three PE classes were

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videotaped and analyzed using the Computerized Evaluation Protocol of Interactions in Physical Education (CEPI-PE). In addition, interviews with school personnel and children were conducted. Results showed the percentage of interactions between target students and peer tutors to significantly increase (3.2-11.8%, respectively; p < .05) during the peer tutor program. All students maintained their high percentage of activity engagement throughout baseline and intervention phase (50.5 and 57.6%, accordingly). In addition, qualitative data throughout field notes and interviews with school personnel and pupils confirmed a positive class climate change and improvement in peer relation culture. Previous studies reflect such positive outcomes. Using quasi experimental designs, research has shown peer tutoring interventions to be effective for the inclusion of students with disabilities in physical education providing benefits for motor performance (Houston-Wilson, Lieberman, Horton, & Kasser, 1997; Ward & Ayvazo, 2006), motor engagement (Klavina & Block, 2008; Lieberman, Newcomer, McCubbin, & Dalrymple, 1997; Lieberman, Dunn, van der Mars, & McCubbin, 2000; Wiskochil et al., 2007), and social interaction between tutors and tutees (Klavina & Block, 2008). Professional development on the implementation of this strategy may provide physical educators with an effective means of providing assistance to students with disabilities, without the need for additional personnel such as APE specialists or paraprofessionals.

## METHODOLOGY

The purpose of this study was to determine the effectiveness of an online professional development (OPD) course to enable physical educators to implement a peer tutoring program in their classes. Specifically, does an OPD course provide physical educators with increased knowledge about, and perceived ability to implement, peer tutoring, and do the teachers perceive the online environment as a satisfying environment to receive professional development? The study was conducted in three phases: (1) preliminary procedures to develop the OPD course, (2) data collection methods, and (3) data analysis. This chapter outlines the steps for each phase.

### **Phase 1: Preliminary Procedures: OPD development**

Phase 1 involved four steps: (1) defining the OPD content, (2) format of the OPD,(3) multimedia use, and (4) basic design of the study.

## **Step 1: Considering Content**

The first step in creating the OPD in-service course was to define the content: what content would enable the teachers to better include students with disabilities in the physical education (PE) class? A review of literature was first conducted to assess what strategies have empirical support and which may be beneficial topics for OPD for physical educators. Results revealed 6 strategies that have empirical support: (1) Pparaprofessionals: (Murata & Jansma, 1997), (2) adapted physical education specialists (Vogler et al., 2000; Block & Zeman, 1996; Vogler, Koranda, & Romance, 2000), (3) collaborative Team Approach (Heikinaro-Johansson, Sherrill, French, & Huuhka, 1995), (4) embedded Instruction (Valentini and Rudisill, 2004), (5) cooperative Learning (Grenier, 2006) and (6) peer tutoring (Houston-Wilson, Lieberman, Horton, & Kasser, 1997; Lieberman, Dunn, van der Mars, & McCubbin, 2000; Lieberman, Newcomer, McCubbin, & Dalrymple, 1997; Temple & Lynnes, 2008; Ward & Avvazo, 2006, Klavina & Block, 2008; Wiskochil et al., 2007; Klavina & Block, 2008). The principal investigator chose peer tutoring as the focus of the OPD due to it being low cost, practical, does not require the presence of extra personnel, and is empirically supported to improve both the physical and social experience for students with disabilities in inclusive physical education (Klavina & Block, 2008). In addition, it was considered to be a skill that the teachers could learn in a timeframe the aligned with the professional development criteria for Virginian teachers (five hours for short-term professional development course). An analysis of the research on peer tutoring revealed a number of components deemed necessary for an effective peer tutoring program. According to the literature (Cervantes, Lieberman, Magneisio & Wood, 2014; Kalef, Reid, & McDonald, 2013; Klavina & Block, 2008; Wiskochil et al., 2007) to effectively implement a peer tutoring program, teachers must be able to:

- Choose a peer tutoring format
- Choose a peer tutor
- Prepare the class for peer tutoring

- Train the tutors in their roles and rules
- Train the tutors in appropriate communication strategies
- Train the tutors in appropriate instructional strategies
- Train the tutors in providing feedback
- Train the tutors in appropriate motivational strategies
- Assess the program for safety and success

In addition to these components, it was necessary to inform the teachers of the benefits of peer tutoring in order to motivate them to implement the program and realize the relevance and practicality of the OPD course. Ten objectives therefore served as the framework for course content.

## **Content Validation**

To validate these objectives, and the specific content surrounding these objectives, a three-step process was conducted. First, the principle investigator wrote the scripts that presented the information focused on the 10 objectives. Second, the PI's faculty advisors read the scripts, and through discussion consensus was reached on the specific content and wording for content. Finally, a survey was sent to five experts of adapted physical education and peer tutoring to validate that the content of the course aligned with best practices of peer tutor program implementation. Experts were asked for their opinion on three items. First, the objectives were presented and experts were asked to rate the importance of, and time that should be allocated to each objective. Second, the content script that corresponded to each objective was presented. Using a scale of 1 to 10 (1 representing strongly disagree, and ten representing strongly agree), the experts were asked to respond to the following questions: (1) does the content in this podcasts align with research on peer tutoring? And, (2) is the content sufficient to fulfill the objective? A priori threshold of 6 was decided upon by the PI. Ratings greater than six resulted in the content being deemed valid and used for the OPD course. A rating of 6 or less resulted in the PI returning to the scripts and making edits based on the expert suggestions. Finally, experts were asked to suggest additional objectives that they deemed necessary to included in the course. Appendix A outlines the questions posed, expert responses, and edits and actions completed by PI.

## **Step 2: Format of the OPD**

To ensure most effective learning occurred, and to overcome the issues identified in other PD courses, theories of adult learning were examined so as a theoretical foundation for course design could be defined and provide a structure for the OPD course. Adult learning theory influenced the design of the course. Specifically the four principles of adult learning theory underpinned the course design.

- Adults need to be involved in the planning and evaluation of their instruction.
- Knowles second principle relates to the importance of experience for adult learning.

- Adults are most interested in learning content that have immediate relevance and impact to their job or personal life.
- The final principle of adult learning, according to Knowles, is that adult learning should be problem-centered rather than contentoriented.

Due to the comprehensive application principles outlined by Knowles, that have been demonstrated to be successfully integrated into past adult education courses (e.g. Quinney, Smith, & Galbraith, 2013), it was chosen as the theoretical framework for the study.

The course design reflects the andragogical principles posited by Knowles (1968). Adults need to be involved in the planning and evaluation of their instruction. When beginning the course, learners were encouraged to choose a student in one of their classes that they feel would benefit from a peer tutor (Appendix B). For the remainder of the class, teachers were directed through a process of designing and implementing a peer tutoring program for this student. However to ensure meaningful learning and autonomy for the teachers, a variety of strategies were offered and the teachers choose what strategies they saw as best for their situation. For example, although the course suggested many strategies that the teacher can use to prepare the class for peer tutoring, the teachers were invited to choose what strategies best suited their class (Appendix C).

The learner was also involved in the course evaluation. Two methods of evaluation were used. First, teachers completed written reports on the success of their application of each sections lesson. Second, teachers were asked to record the interaction between them and the tutor (during training) and between tutor and tutee (during implementation) (Appendix D). Activities during the course consisted of open-ended questions asking teachers to make their own decisions about how the lessons in the course are applicable to the teacher's unique situation. Teachers were then prompted to provide a rational for their answer choices. Finally, due the asynchronous format, the course was flexible for teachers allowing them to choose when to complete each section of the lesson. This also provided the teachers with autonomy, further fulfilling Knowles first principle of adult learning theory.

Knowles second principle relates to the importance of experience for adult learning. This principle underlies the design of the OPD course. First, learners began the course by reflecting on challenges they experience in their classes related to including students with disabilities. Knowles notes the importance of learning from negative experiences, as well as positive. Identifying these challenges aims to increase the learners' motivation and focus for learning.

After watching each podcast learners were prompted to reflect and report, on how the course lessons related to their class. This involved a reflection on past experiences in their classes, an evaluation of the new knowledge learned, and a synthesis of how it could be best applied to their situation.

Finally, one of the primary learning activities in the course was each section's application activity; this involved the learners taking the course lessons and applying it to their classroom. For example, section two focused on training the tutors in instructional strategies; at the end of the course, learners were encouraged to return to their classes and train a tutor in instructional strategies. Furthermore, reporting on this application increased learning from this experience.

Adults are most interested in learning content that have immediate relevance and impact to their job or personal life. PTPE was designed to capitalize on this, by providing teachers with an evidence-based (Qi, & Ha, 2012) strategy that will overcome many of the challenges teachers face in physical education. The first activity highlighted this aspect of the course when learners were prompted to reflect on challenges they experience in physical education relating to including a student (Appendix E). Peer tutoring, and its benefits, was then presented. Furthermore, PTPE was designed so as each section had a practical lesson that could be applied directly to the class. This allowed teachers to see the immediate relevance of the course to their teaching.

The final principle of adult learning, according to Knowles, is that adult learning should be problem-centered rather than content-oriented. To fulfill this principle this course offered teachers strategies to overcome inclusion problems that they had identified. At the beginning of the course teachers identified a student that presented a challenge to include in physical education; a student who may benefit from peer tutoring (Appendix F). Throughout the course teachers were reminded that they should choose from the array of strategies offered depending on their unique situation. For example, teachers should choose a peer tutoring program format and peer training plan that best suited their identified "challenging" student. In addition, all activities in the class were structured around this student; for example, teachers were directed to prepare the class for the peer tutoring program and train the tutors for the identified tutee. This design ensured that learning remains problem focused.

## Step 3: Multimedia Use

Knowles theory of adult learning provided the structure for the class. However, specific design principles must also be applied to utilize multimedia to effectively present information to the learner. The presentation of content, and not only the substance of the content, was imperative for an effective course. Clarke and Mayer's (2003) principles, derived from the cognitive theory of multimedia learning, provided structure for the presentation of material in this course. These evidence-based principles aided us in streamlining instruction, thus reducing cognitive load.

The following examples demonstrate how these principles were reflected in the design of the podcasts, the main method of instruction used in this course. Principles were first provided that reduced the extraneous processing load for the learner. Adhering to these five principles overcomes the issue of the learner having to process information that does not assist the learner in remembering or interpreting the information (Mayer, 2008).

**Coherence principle.** People learn better when extraneous words, pictures, and sounds are excluded rather than included. This allows the learner to reserve their processing capacity for attending to the relevant material only. The

podcasts created for PTPE adhered to this principle in three ways. First, although pictures were an important aspect of enhanced podcasts, they were not used excessively in the podcasts. Pictures only change when important, new information, was being presented. Second, words were kept to a minimum also; only necessary information was presented to the learner (Appendix G). Where the course designer thought some learners may benefit from and want additional information, they were directed to download an additional document. This prevents all learners from receiving the extraneous information. Finally, on screen text was kept to a minimum also. In the podcasts, text was only used to highlight key information (see Appendix H for an example) or to present a question upon which the learners should reflect.

**Redundancy principle.** People learn better from animation and narration than from animation, narration, and on-screen text (Mayer, 2008). This principle is rooted in the cognitive theory of multimedia learning; the presence of both narration and on-screen text causes two incoming verbal streams that caused extraneous processing. In PTPE the podcasts were primarily creating using narration and pictures. On-screen text was only used to highlight essential information.

**Signaling principle.** People learn better when the words include cues about the organization of the presentation. Signaling is done at multiple stages throughout the course, highlighting important material to be covered in the lesson or podcast. First, in the first section of the course there was a podcast dedicated to providing a course overview; informing the learner about the content of the four

sections. Then, at the beginning of each section, there was an overview of the section's contents (Appendix I). Furthermore, at the beginning of each podcast, there was a statement of "in this podcast you will learn" (Appendix J). Each page also had a heading that gave an overview of the material to be covered. The changing pictures and on-screen text in the podcasts also served to signal essential information.

**Spatial contiguity principle.** Thus far, principles have been focused on removing extraneous cognitive processing due to unessential content. However, the learner can also be forced to undergo unnecessary cognitive processing due to ineffective information presentation; for example, when words and pictures are placed far from each other on the screen. This forces the learner to have to scan the screen or look for the relevant information. People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen (Mayer, 2008). To minimize extraneous cognitive processing by layout design in PTPE, when text and pictures were used on one screen (e.g. in the podcasts), the text was presented on, or directly over or under the picture (Appendix K). Such a layout removed the need for undo cognitive processing as a result of scanning the screen.

**Temporal contiguity principle.** To further prevent extraneous cognitive processing due to ineffective presentation of information, it was shown that people learn better when corresponding words and pictures were presented simultaneously rather than successively. The cognitive theory of multimedia learning states that learners must have the corresponding words and pictures in working memory simultaneously so as they can make connections between them (Mayer, 2008).

In the podcasts where words and pictures were used, they were presented simultaneously. In addition, when text and spoken words presented the same information, they were presented simultaneously. This negated the cognitive processing requirement that successive presentation of the same material would pose.

Through adhering to these principles the online course reduces the need for extraneous cognitive processing to allow for deep learning of the important content. However, to maximize learning of the important information, we must also apply principles to manage the planned essential processing. This prevents the information from overwhelming the learner (Mayer, 2008).

**Segmenting principle.** People learn better when a multimedia lesson is presented in learner-paced segments rather than as a continuous unit (Mayer, 2008). According to the cognitive theory of multimedia learning, segmenting, as opposed to continuous presentation of information, allowed for the learner to fully process sections of content before progressing to new content. In PTPE, segmenting was implemented in the creation of the podcasts. Each podcast focused on a specific topic, which each lasted an average of two minutes. The learner then clicked the next button to progress to an activity that applied the podcast's lesson. The learner then continued to the next podcast. For example, in the final section of the course, focusing on the teacher's role in implementing the peer tutoring program, the learner progressed through three podcasts: "ensuring safety;" "ensuring success;" and "overcoming challenges."

**Pre-training principle.** People learn better from a multimedia lesson when they know the names and characteristics of the main concepts (Mayer, 2008). This prior knowledge allows the learner to dedicate their full cognitive capacity to the new information. In this course, an example of pre-training was the overview of peer tutoring that occurred at the beginning of the course. Similarly, pre-training occurred at the start of each podcasts. For example, the definitions of the different types of peer tutoring formats were given, prior to the learner being presented with the advantages and disadvantages of each format.

**Modality principle**. People learn better from pictures and narration than from pictures and on-screen text (Mayer, 2008). This principle is suggested so that full attention can be given to the pictures, and not split between pictures and text. The cognitive theory of multimedia learning posited that information should be presented via narration, so as to off load the processing of the information from the overused visual system. The podcasts created for this course were designed with this principle in mind. For the majority of the podcasts, information was presented by audio and pictures. On-screen text was used only to highlight essential information and was kept to a minimum.

Such principles will ensure that the information that is essential to this online course is presented in a format that maximizes the learner's ability for cognitive processing. Now that the extraneous information is minimized and the essential information managed, principles that engage the learners in generative processing are required.

**Personalization principle.** People learn better when the words are in conversational style rather than formal style (Mayer, 2008). This principle can be seen implemented throughout the podcasts. For example, the narration frequently included terms such as "in your class" and "for your student." Such vocabulary created a personalized tone that created a sense of social partnership with the narrator, which encouraged the learners to pay greater attention to the content (Mayer, 2008).

**Multimedia principle.** The cognitive theory of multimedia learning states that learners learn better when they receive a verbal and visual representation of the same material; a cognitive process of integration of the material can then occur (Mayer, 2008). The podcasts created for this course utilized this principle by presenting information using text and visuals. On-screen text was only used to highlight important information.

To assess the fidelity of the application of the principles of cognitive theory of multimedia learning to the podcasts presented in this course, an expert group was involved in a fidelity check. The expert group (n = 4) rated the adherence of four randomly chosen podcasts to the principles posited by Clarke and Mayer (2008). The group was asked to rate each podcast on each of the 10 principles; when a rating of less than 6 was given, the expert was asked to provide a rationale their rating. To ensure accurate application of these principles to the course's podcasts, two reviewers provided feedback on randomly chosen podcasts to be used in the course. Reviewers first watched a training video on how to apply Mayers' principles to podcasts similar to those used in the project. Examples of correct application were provided. Reviewers than viewed the three randomly chosen podcasts and responded to the statement; "Mayer's principles are effectively applied to this podcast?" using a rating scale 1 to 10 (1 = strongly disagree, 10 = strongly agree). An apriori rule of 6 was set which, if violated, resulted in the reviewers providing feedback about which of Mayer's principles were violated. The PI would then return to the podcasts to make the necessary edits. No violations were made. Across the three podcasts, reviewers strongly agreed that application to Mayer's principles was effectively completed (M = 9.23). See appendix N for complete directions and reviewer responses.

### **Step 4: Basic Design of the Study**

To assess the effectiveness of the OPD course this study used a true experimental design in which there were two groups: an experimental group, which received the OPD training; and a control group which did not (Tavakoli, 2013, p.482). This design was deemed the best, most widely accepted method for determining program effects (Department of Education, 2007). For the purpose of this study, a wait-list control group, to which participants have been randomly assigned, served as an untreated comparison group during this study (Elliott & Brown, 2002). The control group completed the online course after participants completed pre and post tests. They were not restricted from any other activities. The timeline for the study is presented in Table 2. It involved six steps:

- The online course was promoted to physical educators of Virginia and New York.
- All teachers who enrolled in the course were randomly assigned to an experimental (take course immediately) or control group (wait listed).
- Both groups completed their pre-test content knowledge test
- The experimental group completed the OPD course. During the course, all experimental group participants were invited to complete the application activities, and report on their application of each of the course sections' lessons.
- Four weeks later, after the course was completed by the experimental group, all teachers again completed the content knowledge test. Participants of the experimental group also completed the PPD survey.

• Four weeks later, the experimental group completed the content knowledge test for the final time to assess their retention of the course content.

# Table 2

## Course overview

Section	Lesson	Action	Application of ALT
(1) Preparation:			
Objectives:	Introduce course:	Apply the "class preparation" strategies	Principle 3 (Identifying individual
- PE teachers will	Explain format. Suggest	preparation strategies	challenges increase the learner's
recognize the benefits	learners work through the	to a class that may benefit from peer	perception of the content being
that peer tutoring has for	resource, section by section,	benent nom peer	relevant)
all involved.	applying the lessons learnt in	tutoring. Provide feedback on the	Principle 4 (Identifying the challenges
- PE teachers will know	their classes, prior to		will also allow the course to be problem
how to prepare the	progressing to the next section.	resource discussion forum.	centered).
physical education	Explain interface and		Principle 2 (implementation activity)
environment for peer	discussion forum		

tutoring and choose a	Benefits of peer tutoring
type of peer tutoring	Identification of student to
program suitable for their	benefit from the program
class.	Choosing a peer tutoring type
	Strategies for preparing the
	class for a peer tutoring
	program (disability awareness
	etc).

## (2) Interaction:

	Training tutor in roles and rules	Train potential tutors in	Principle 1: the choosing of roles will
Objective:	Training the tutor in	the use of these strategies	determine the learners' path through the
- PE teachers will be able to	communication strategies	(reminder: it may be	course, as defined by their needs. Teachers
train peer tutors in the use	Training the tutor in instructional	beneficial to first train a	self report on this application.
of appropriate	strategies	tutor to work with a	Principle 2 (implementation activity)

communication and	How to use practice scenarios to	student without a	Principle 3 (choosing tutor roles that reflect
instructional strategies.	train tutors	disability first).	the teachers situation)
<ol> <li>(3) Feedback</li> <li>PE teachers will be able</li> <li>to train peer tutors to</li> <li>provide feedback and</li> <li>motivation for the tutee.</li> </ol>	Train the tutors to in providing feedback Train the tutors in motivational strategies How to use practice scenarios to train tutors		Principle 1 (teachers watch podcasts necessary to implement their unique peer
		without a disability	situation

first)

(4) Implementation – PE	Assessing the program	Implement a peer	Principle 2 (implementation activity)
teachers will be able to	Overcoming challenges	tutoring program with	Principle 4: learning is problem centered;
implement and assess the	8 8	one student/class.	strategies provided based on potential
peer tutor program.	rowning recuback to tutors	one studenty class.	issues teachers may face.

*Note*: Throughout the course, podcasts are designed using the cognitive theory of multimedia learning



Figure 2. Study Design

# Table 1

# Study Timeline

Item	Month of completion
Course promoted for physical educators of	
Virginia and New York	Nov
Teachers enroll in course	
	Nov/Dec/Jan
Teachers provide consent for study	
participation	Dec
Teachers complete content knowledge survey	
(pre-test)	Dec/Jan/Feb
Teachers in experimental group complete	
course activities	Dec/Jan/Feb
All teachers complete post content knowledge	
survey	Dec/Jan/Feb
Experimental group complete online learning	
satisfaction survey	Jan/Feb
Control group complete course activities	
	Feb/ongoing
Data analysis	
	Feb

#### **Phases II: Data Collection**

#### **Institutional Review**

The data collection phase included obtaining approval from the University of Virginia Institutional Review Board (IRB). The study (protocol number 2014-0193-00) was deemed exempt from review by the University of Virginia's IRB board due to it posing minimal risk to participants. The IRB application included consent procedures, assessment items and study protocols. **Participants** 

Based on GPOWER (Faul, Erdfelder, Buchner, & Lang, 2009) calculations—with power acceptable at .80— the current study had a target total sample of 34 participants. After recruitment, 51 participants were recruited to complete the course and participate in this research. Randomization resulted in 29 teachers assigned to the experimental group and 22 teachers assigned to the control group.

## Procedures

Procedures are presented in the sequential order in which they occurred.

**Recruitment.** The course was promoted using a variety of methods: (a) Virginian teachers received an email from the Department of Education; (b) New York teachers received an email from the State Association for Health, Physical Education, Recreation and Dance; (c) the PI gathered email addresses from PE teachers whom were provided with a face-to-face PD workshop in August and followed up with an email with the OPD details; (d) a promotional flyer was distributed and a promotional video was shown to participants at a state conference on inclusion in physical education; and (e) the primary researcher conducted another professional development course in one school district unrelated to peer tutoring—and used the opportunity to promote the online course. Teachers interested in enrolling in the course emailed the PI on the alias email address <peertutoring@virginia.edu>.

**Obtaining Consent.** Upon enrollment in the course, all teachers were randomized to an experimental or a control group. Both groups then received an email explaining that they are invited to participate in the study. They were informed that, in order to assess the effectiveness of the course, after pre-test completion, half of the teachers would be placed on a wait list while the other half would gain immediate access to the course. All teachers then proceeded to complete the pre-test. After completing the pre-test, the experimental group gained immediate access to the course; the control group was placed on a waiting list; and the teachers who did not wish to participate in the research gained immediate access to the course.

**Participant Procedures.** First, both groups completed a pre-test. The experimental group then proceeded to complete the course. During course completion, they were involved in self report activities (reporting on their application of the lessons from section 1, section 2, and section 3). The teachers were invited to also upload audio recordings of the three application activities. Meanwhile, the control group was on a wait list. After period of four weeks, all participants again completed the content knowledge test. The experimental group also completed a Perceptions of Professional Development Survey (Buschang, 2012). The control group then began the course. Post course completion, the control group completed the content knowledge test and

Perceptions of Professional Development Survey (Buschang, 2012). Finally, both groups were asked to complete the content knowledge test for the final time four weeks after course completion to assess their retention of the knowledge learned.

## Instruments

To assess the OPD's effect on teachers' knowledge; ability to apply the lessons learned; and their overall satisfaction with the online environment, 3 dependent variables were assessed.

**Content knowledge measure.** All participants completed a 22 question survey (pre, post, and retention) assessing their knowledge of PT (Appendix M). The questionnaire included a mixture of opened-ended and multiple choice questions pertaining to defining PT, benefits of PT, preparing for PT, training the tutors, and implementing and assessing PT. All questions were derived directly from the course content, therefore reflecting the objectives of the course. The survey questions were validated by an expert group (n = 4) who responded to the statement. "The above questions are effective in assessing the students," for each objective on a scale of 1 to 10, with 1 reflecting strongly disagree and 10 representing strongly agree. An apriori criterion of 6 was set, meaning a score of greater than 6 resulting in the question being deemed effective. Experts were also invited to provide general feedback on questions. Full instruction, expert responses and subsequent actions completed by the PI are presented in Appendix N. The final content knowledge test and rubric is presented in Appendix M. An intraclass correlation was assessed to determine the accuracy of the PI's scoring of the content knowledge test. This involved two additional

raters scoring a randomly selected sample of five responses for all data sets. A high degree of reliability was found between raters' scores. The average measure Intraclass Correlation Coefficient was .996 with a 95% confidence interval from .981 to 1 (F[4,8] = 259.579, p < .001).

**Course Lesson Application Assessments.** As part of course completion, all teachers were encouraged to document their success in implementing each section's practical lesson. This involved a written report on their application of the lesson. For triangulation purposes, teachers were also encouraged to audio record their interaction with the tutor (during training), or the interactions between the tutor and tutee (during implementation) and upload it with their written report. See Appendix O for self-report instructions. To assess the effectiveness of the instructions, a focus group (n = 5) discussed the instructions for wording and possible biases (leading questions). Reports and recordings were analyzed by the PI using a rubric (Appendix P). The rubric was created by the PI, discussed and refined by the focus group, and reflected the course content validated by the experts. Application was reported as follows:

Self report measures were divided into two components and each was evaluated separately to determine the effectiveness of the program:

(a) Preparation: Teacher completes basic, essential activities: total points equating to adequate preparation: 4.

(b) Training: Teacher complete all training activities: total point equating to adequate completion of training: 3-9 (This number varies depending on number of chosen tutor roles).
Assessment of participant's implementation results in five "levels of implementation":

(1) A prepared program: completed all four preparation activities

(2) A program with trained tutors: completed a minimum of 3 training activities.

(3) A prepared program with trained tutors: completed all preparation activities and a minimum of three training activities.

(4) Partially completed program: referred to individuals with some activities completed, not sufficient to meet the criteria for other "levels of implementation." For example, teachers who just prepared the class for peer tutoring would be included in this level.

(5) No implementation completed: teachers did not complete any implementation activities.

#### The Perceptions of Professional Development (PPD) Survey (Buschang,

2012). An adapted version of the survey to assess short-term teacher professional development was used to determine the learners' perspectives of the online course (Appendix Q). This survey poses 10 statements to which participants responded on a four point scale, ranging from 1 (strongly agree) to 4 (strongly disagree). Statements focus on the effectiveness and usefulness of the professional development experience, and has an internal consistency of .87 (Cronbach's alpha). Two questions were adapted for the purpose of assessing this course. Question six was changed from "I learned about natural selection from this training" to "I learned about peer tutoring from this training," and question 4 was changed from "I will use the examples from this training in my classroom" to "I will use peer tutoring in my class." In addition, an extra eleventh question was added: "The podcasts were effective in providing information about peer tutoring." Finally, the survey asked two opened-ended questions seeking the learners perceived strengths and weakness of the course. Two further open-ended questions were also added: (1) if you did not implement the activities from this course to your class, please provide a rationale, and (2) participants were asked if they had any further comments.

**Demographic questions.** Demographics questions were also asked so as condition equivalence could be assessed between experimental and control groups. During course completion a variety of demographic questions were posed to the participants, relating to age, gender, teaching experience, prior PD experience, training in inclusive practices and their current use of peer tutoring in their classes (Appendix R). Due to the realization that this may result in a lack of demographic information on individuals who drop out of the course, demographic questions were moved to the end pre-test, thus answered prior to entering the course.

#### Phase III: Data Analysis

**Condition equivalence.** Before analyses of research questions, condition equivalence between control and experimental groups was assessed. Continuous demographic questions (for example years of experience) and content knowledge pre-test scores were compared using an independent samples T-test. Such a method is appropriate when subjects are unpaired and the outcome variable is normally distributed, and variance is considered equal (Elliott & Woodward, 2007). Differences between control and experimental groups on categorical demographic variables were examined for demographic variables (such as educational level and PT practices and intention data) using a chisquare test. A chi squared test is appropriate for use when expected cell size is greater than one and no more than 20% are less than five (Corchran, 1954; Adams & Lawrence, 2014). A correlational analysis of the content knowledge test and background characteristics was also conducted using Pearson's R. This allows the relationships between variables for the whole group and for each group separately to be examined.

#### **Analysis for the Research Questions**

**RQ 1:** What is the average effect of participation in an OPD course, on knowledge related to peer tutoring, for physical educators relative to physical educators who do not complete the OPD course?

This question assessed differences between experimental and control groups on the content knowledge survey. Results revealed the effect of the professional development course on the level of knowledge of the participants pertaining to PT. The null hypothesis was: there would be no significant difference in content knowledge scores between the control group and experimental group at posttest and retention. Due to there being two groups (control = 0, experimental = 1), which served as the between subject measures and two repeated factors were being investigated (time and treatment), which served as the within subjects measure, a mixed-design/split-plot analysis of variance (ANOVA) was conducted (Stevens, 2009). A mixed-design/split-plot ANOVA was used to examine time for both groups (experimental and control); time and treatment was examined for the experimental group independently for the content knowledge test. Mixeddesign/split plot ANOVA was also used to examine between subject measures of the two groups based on time. Within subject repeated measures (time and treatment) were examined for the treatment group only (Stevens, 2009).

# **RQ 2:** In what ways, if any, does participation in an OPD course result in teacher implementation of a peer tutoring program in a physical education class?

It was hypothesized that participation in the course would result in physical educators in the experimental group implementing peer tutoring in their classes. This was primarily assessed through self-report. The teachers in the experimental group completed three written reports on their application of the lessons from each of the course's sections. On entering section 2, 3, and 4 the teachers were prompted to report on their success in applying the previous section's activity. Each report was assessed by the PI using a rubric based on the course content, thus ultimately derived from the literature and validated by a focus group. In addition, for triangulation purposes, audio recordings uploaded by the teacher, were also requested and assessed. The same rubric was used to assess the written report and audio recording. Descriptive statistics were calculated on the implementation level among participants. When teachers did not implement the lessons to their class, they provided a rational for not doing so; these responses were quantified and descriptive statistics presented. RQ 3: How do physical educators perceive the online environment as a setting for professional development?

The PPD Survey (Buschang, 2012) was assessed using both quantitative and qualitative methods. The scale variables were combined to provide an overall satisfaction score for participants and descriptive statistics were calculated. Pearson's R was also calculated to assess how demographic variables, such as age, gender and teaching experience correlate to perceived satisfaction. The three open-ended questions on perceived weaknesses and strengths of the course were thematically analyzed using Braun and Clarke's (2006) "recipe" for qualitative analysis.

#### Conclusion

After a review on literature on teacher professional development and strategies for inclusive physical education, an online professional development course was created. Overcoming previous weaknesses of online professional development courses due to lack of theoretical basis, the course was created based on the principles of adult learning theory and Mayer's principles of instructional design. The course aimed to enable physical educators to implement a peer tutoring program in their classes. The central research question was as follows: "How does an online asynchronous professional development course affect physical education teachers' ability to implement a peer tutoring program?". To answer this question, a true experimental design was employed utilizing both quantitative and qualitative methods of data collection. This chapter outlined the research questions, course design procedures, setting of the research study, role of the researcher, data collection and data analysis plan.

#### RESULTS

The purpose of this study was to determine the effectiveness of an online professional development (OPD) course to enable physical educators to implement a peer tutoring program in their classes. Specifically, does an OPD course provide physical educators with increased knowledge about, and perceived ability to implement, peer tutoring, and do the teachers perceive the online environment as a satisfying environment to receive professional development? This study was conducted using a mixed-method approach. Results will be presented in four sections: (a) Descriptive; (b) Content knowledge test results; (c) Implementation results; and (d) Perceptions of the PD experience.

#### **Descriptive Statistics**

Fifty-one physical education teachers (n = 21 males and n = 30 females) participated in this research study. For the experimental group research participation was defined by completion of at least 65% of the course content, and completion of the content knowledge pre and post test and/or having self-reported on course application activities. Sixty-five percent of course completion was deemed adequate as this was the minimum percentage of content required for an overview of the steps for implementation of a basic peer tutoring program. However it emerged that teachers completed a mean of 92.18% (*SD* = 9.66) of the course with a range of 69% to 100%. Research participation for the control group was defined by completion of the pre and post content knowledge test.

Missing values varied across data collection methods; therefore, prior to presenting descriptive statistics on the demographics of participants, it is necessary to provide an overview of study activity completion statistics (see Table 4).

	Expe	erimental ( <i>n</i> = 29)	Control ( <i>n</i> = 22		
Research activities completed	n	%	n	%	
(1) Course completion	29	100	7	31.81*	
(2) Pre-test	23	79.3	22	100	
(3) Post-test	26	89.7	22	100	
(4) Retention content knowledge test		44.8	1	4.5	
Application activities completed:					
(4) All activities implemented	8	27.5	0		
(5) Some activities implemented	12	45.45	4	18	
(6) Perspective of Professional	10				
Development Survey	12	41.4	4	18.2	

### Activity completion rates in experimental and control groups

\*at the time of analysis some members of the control group remained active in the course.

Over 56% (n = 29) of the teachers taught physical education at the elementary level, with 15.7% (n = 8) teaching at the middle school level and 15.7% (n = 8) teaching in high school. An additional 9.8% (n = 5) indicated that they taught at multiple levels and one participant failed to respond to this question. Teaching experience of participants ranged from 1 year to 35 years, with a mean of 12.74 (SD = 9.72) years teaching experience. The vast majority (92.2% n = 47) of participating teachers reported having students with disabilities in their classes. Two individuals failed to respond to this question. Teachers were also asked to report on challenges they experienced in including children with disabilities in their physical education classes. After thematic analysis using Braun and Clarke's (2006) "recipe" for thematic analysis, seven categories of challenges emerged from the data: (a) issues related to class size (15.7% n = 8); (b) issues related to lack of space (5.9% n = 3); (c) an inability to meet diverse student needs (19.6% n = 10); (d) safety concerns (3.9% n = 2) (e) challenges related to socialization for the student with a disability (3.9% n = 2); (f) a lack of time (7.8% n = 4), and (g) challenging behaviors (5.9% n = 3).

In regards to the teacher preparation, 19.6% (n = 10) of participants held a bachelor degree as their highest level of education. The major of the bachelor degree involved physical education and health for all participants who responded to this question. The majority of teachers (78.4% n = 40) held a masters degree as their highest level of education, which comprised of health (47.5% n = 19), special education (5% n = 2), adapted physical education (17.5% n = 7), with 30% (n = 12) noting "other." Specifically related to training in adapted physical education, training experiences varied included one or two undergraduate courses in adapted physical education for 66.7% (n = 34), a masters in adapted physical education for 17.5% (n = 7), and no training in adapted physical education for 9.8% (n = 5) of respondents. Five individuals failed to answer this question. In addition the majority (94.1% n = 48) of participants were state certified physical educators and 25.9% (n = 13) of participants were certified adapted physical education specialists. Just one of these individuals identified themselves as being a certified in adapted physical education but not certified in physical education.

Teachers were also asked about their prior experience of using peer tutoring in their physical education classes. The majority, 47.1%, (n = 24) had previously used untrained peer tutors in their classes. Over 43% (n = 22) of participants had never previously used peer tutoring, and a minority, 7.8%, (n = 4) previously used trained peer tutors in their classes. One teacher neglected to answer this question. Finally, teachers were also asked about their motivation for completing the online professional development course. For 43.1% (n = 22) of teachers, their motivation for completing the course was a desire to implement a peer tutoring program in their classes. A third of teachers (33.3% n = 18) of teachers indicated that they just wanted to learn about peer tutoring, with the remaining 11% (n = 6) indicating that earning continuing education units was their motivation, with 2 participants opting to not answer this question.

Prior to quantitative and qualitative data analysis, condition equivalence was assessed between the experimental and control groups to assess if randomization was successful. First, independent t-tests demonstrated that there was no significant differences between experimental and control conditions on the continuous variable, years of teaching experience. Results showed the years of teaching experience for the experimental group (M = 13.39, SD = 10.59) was not significantly different that the control group (M = 11.91, SD= 8.66); t(46) = .521, p = .605).

For categorical variables, Chi-Square analysis was conducted and revealed that the groups were not significantly different in gender, teaching situation, highest level of education, motivation for course completion, experience in using peer tutors, and certification in APE. Examination of condition equivalence for these variables is presented in Table 5. As all but two participants had students with disabilities in their classes and had a state certificate in physical education, it was not necessary for condition equivalence to be calculated for these variables.

#### Experimental Control (n = 27)(n = 21)**Demographic Variable** $\mathbf{X}^2$ % % df Р n n Male 11 52 10 47.6 1 .124 .724 Female 18 60 12 40 1 .124 .724 **Certified APE** 8 5 1 61.5 38.4 .341 .559 **Highest level of Education:** Bachelor 6 60 4 40 1 .046 .830 22 Masters 55 18 45 1 .005 .941 **Motivation for course** completion: Want to implement PT 13 59 9 40.9 1 .013 .910 Want to learn about PT 11 64.7 6 35.3 1 .947 .331 Want to earn CEU 3 50 3 50 1 .000 .988 **Exp. In using PT:** Used untrained PT 13 54.2 11 45.8 .002 .967 1 Used trained PT 3 75 25 1 1 .547 .460 Did not use PT 12 45.5 .503 54.5 10 1 .449

#### Comparison of Condition Equivalence for Categorical Variables

## **Teaching Situation:**

Elementary	15	51.7	14	48.3	1	.589	.577
Middle	4	50	4	50	1	.211	.646
High	5	62.5	3	37.5	1	.100	.752
Other	4	80	1	20	1	1.150	.283
Highest level of APE training:							
No training	3	60	2	40	1	.000	.988
1/2 undergrad courses	20	58.8	14	41.2	1	.075	.784
Masters	6	55.6	4	44.4	1	.034	.864
Other	0	0	2	100	1	2.799	.094

#### **Quantitative Results**

**RQ1:** What is the average effect of participation in an OPD course, on knowledge related to peer tutoring, for physical educators relative to physical educators who do not complete the OPD course?

**Testing Assumptions.** Prior to running the split plot ANOVA on the content knowledge test scores; the assumptions were examined on the data collected. Assumption tests included: (a) additivity, (b) normality, and (c) homogeneity of variance.

**Additivity.** The within-subject factor (Content Knowledge Test) was tested for additivity using Tukey's Test for Non-additivity. Results showed additivity for the content knowledge test scores was assumed with p = .46. (F[1,121] = .566).

**Normality.** Normality of the between subject factor (Content Knowledge Test) was determined using a variety of methods. First, histograms and QQ plots were examined for both pre-test and post-test data; data appeared normal (Appendix S). Skewness and kurtosis values were then assessed and found to be within acceptable limits (< 1.0). Finally, Shapiro-Wilk statistic was also examined and supported the normality of the data (p > .05).

**Homogeneity of Variance.** Levene's test demonstrated equal variances for the pre-test and post test groups (p > .05). At pre-test, content knowledge test scores of the experimental group (M = 35.85 *SD* = 8.51) and control group (M= 36.99, *SD* = 9.86) were not significantly different; t(43) = -.412, p = .682. Correlation analysis was conducted between demographic variables and the dependent pre-test content knowledge test variable, prior to running the Split-plot ANOVA. Pearson's correlation coefficient was examined and revealed that there was no significant correlation between the dependent variable at pre-test and the demographic variables, except for training experience in APE. It was revealed that having no prior training in APE showed to positively correlate with the pre-test scores. Conversely, having completed one or two courses in APE was negatively correlated with the pre-test content knowledge scores.

Correlation between pre-test content knowledge test score and demographic variables

	Pre-test	-
	Pearson	Sig. (2-
Variables	Correlation	tailed)
Female ( <i>n</i> = 30)	0.051	0.739
Male ( <i>n</i> = 21)	-0.051	0.739
Undergrad as highest level of education $(n = 10)$	0.002	0.988
Masters as highest level of education $(n = 40)$	0.046	0.764
Elementary school teacher $(n = 29)$	0.021	0.891
Middle school teacher $(n = 8)$	0.16	0.294
High school teacher $(n = 8)$	-0.244	0.107
Other teaching situation $(n = 5)$	0.157	0.304
Motivation for course completion: want to		
implement peer tutoring $(n = 22)$	-0.074	0.628
Motivation for course completion: want to learn		
about peer tutoring $(n = 17)$	0.116	0.446
Motivation for course completion: want to earn		
CEUs $(n = 6)$	-0.1	0.515
Previous experience of peer tutors: used untrained		
tutors ( $n = 24$ )	-0.121	0.427
Previous experience of peer tutors: Used trained	0.032	0.833

tutors (n = 4)

Previous experience of peer tutors: have not used

peer tutoring ( $n = 22$ )	0.146	0.337
Training in APE: no training $(n = 5)$	.334*	0.025
Training in APE: one or two undergrad courses (n		
= 34)	338*	0.023
Training in APE: Masters in APE $(n = 9)$	0.227	0.133
Training in APE: Other APE exp $(n = 2)$	0.035	0.819

\* Correlation is significant at the .05 level (2-tailed).

A Split plot (mixed-effect) model indicated that the interaction of time and group was significant, with a large effect size, Wilks Lambda = .454, F(1,41) = 49.282, p < .001,  $\eta^2$  = .546. Examination of the profile plot (figure 2) shows that the experimental group's score on the content knowledge test increased from pre-test (M = 35.85 SD = 8.51) to post-test (M = 63.88 SD = 20.93). Conversely, it can be seen that the control group's scores on the content knowledge test decreased from pre-test (M = 36.99 SD = 9.86) to post-test (M = 35 SD = 10.74) (see table 7). The main effect for time (i.e. within subject factor) was also significant, with a large effect size, Wilks Lambda = .514, F(1,41) = 38.72, p < .001,  $\eta^2$  = .486. This indicated that the change in content knowledge test scores from pre-test to post-test was significant for experimental and control group combined. In addition the main effect of group (i.e. between subject factor) was also significant, with a large effect size, F(1,41) = 31.266, p < .001,  $\eta^2 = .433$ . This indicated that the content knowledge scores differed based on group alone. However, the main effect should be interpreted with caution as a significant interaction was revealed. The null hypothesis that there would not be a significant difference, between experimental and control groups, in the change of content knowledge scores from pre-test to post-test was rejected. See table 8 for a summary of the Split-plot ANOVA results.

## Content Knowledge Test Scores Descriptives

	n Me		SD	Range	
Experimental group:					
Pre-test	23	35.86	8.51	22-56	
Post-test	26	63.88	20.93	22-96	
Control group					
Pre-test	22	36.99	9.86	16.25-54	
Post-test	22	35	10.74	15-51	

						Effect
Source	SS	Df	MS	F	Р	size
Between:						
Group	5044.135	1	5044.135	31.266	.000	.433†
Error	6614.506	41	161.329			
Within:						
Time	5083.405	1	5083.405	38.721	.000	.486†
Time x	(402.00)	1	(402.00)	40.202	000	
group	6482.896	1	6482.896	49.382	.000	.546†
Error	5382.530	41	131.281			

## Split-plot ANOVA Summary for Content Knowledge Test Scores

† Large effect size. ES = partial eta squared =  $\eta^2 = SS_{effect}/SS_{total}$ .



Figure 3. Interaction effects of time and group on Content Knowledge Test Scores

To gain further insight into the change in content knowledge test scores among participants, correlation was assessed between participants' level of improvement on the content knowledge variable (post-test minus pre-test scores) and demographic variables. Pearson's correlation analysis revealed there to be a positive statistically significant correlation between teaching in a middle school and change in content knowledge test scores (p < .05). However, the small sample size involved should be considered when interpreting this finding. See table 9 for full details.

Correlation between demographic variables and content knowledge Test scores change

#### **Change in Content**

### **Knowledge Score**

Variable	Pearson	Sig. (2-tailed)
	Correlation	n
Female ( <i>n</i> = 30)	.022	.890
Male ( <i>n</i> = 21)	022	.890
Undergrad as highest level of education $(n = 10)$	.106	.497
Masters as highest level of education ( <i>n</i> =30)	121	.439
Elementary school teacher ( <i>n</i> = 29)	.056	.719
Middle School teacher $(n = 8)$	448**	.003
High school teacher $(n = 8)$	.063	.689
Other teaching situation $(n = 5)$	.260	.093
Motivation for course completion: want to implement peer tutoring ( <i>n</i> = 22)	056	.719
Motivation for course completion: want to learn about peer tutoring ( <i>n</i> = 17)	.268	.082
Motivation for course completion: want to earn CEUs $(n = 6)$	108	.492

Prior experience with peer tutoring:		
have used untrained peer tutors ( <i>n</i> =	.111	.480
24)		
Prior experience with peer tutoring:	.202	.193
have used trained peer tutors $(n = 4)$		
Prior experience with peer tutoring:	231	.136
have not used peer tutors ( $n = 22$ )		
Training in APE: no training (n = 5)	251	.104
Training in APE: one/two undergrad	.219	.158
courses ( <i>n</i> = 34)		
Training in APE: Masters of APE $(n = 9)$	068	.665
Training in APE: Other APE exp $(n = 2)$	093	.555

\*\*. Correlation is significant at the .01 level (2-tailed).

#### Retention

To assess retention of learning a one-way repeated measures ANOVA was conducted to evaluate the null hypothesis that there is no change in participants content knowledge scores when measured at pre-test, post-test and at retention which occurred four weeks after the post-test was completed. For this analysis, all participants who had completed the pre-test, post-test and retention content knowledge test were combined into one group; resulting in responses from12 participants from the experimental group and one participant from the control group being utilized. Results demonstrated that the knowledge demonstrated at the pre-test (M = 35.56, SD = 8.85) increased at post test (M = 69.5, SD = 15.18) and decreased at retention (M = 60.12, SD = 10.81) (see table 13). Results show there to be a significant time effect, with a large effect size, Wilk's Lambda = .15, F(2,11) = 30.38, p < .001, n<sup>2</sup> = .847. Thus, the null hypothesis that participation in the OPD would not result in a change in content knowledge test scores that is maintained after a period of four weeks, was rejected. Follow up comparisons indicated that the pairwise difference was significant between pre-test and posttest (p < .001) and pre-test and retention (p < .001) but not between post-test and retention (p = .126). This is seen in figure 3.

	Mean	SD	Range		
Combined groups					
( <i>n</i> = 13)					
Pre-test	35.56	8.85	22-53		
Post-test	69.5	15.17	38.50-91		
Retention	60.12	10.81	46-78		

## Content Knowledge Test Score Descriptive; Pre-test, Post-test and Retention



Figure 4. Content Knowledge Test Scores Descriptives for Combined Groups.

# **RQ2:** In what ways, if any, does participation in an OPD course result in teacher implementation of a peer tutoring program in a physical education class?

Prior to the teachers self reporting on their ability to implement peer tutoring, teachers were asked to provide details on the student for whom the peer tutoring program would be planned. Identified tutees ranged in age from 5 to 17 years, with a mean age of 10.18 (SD = 3.44). The tutees' disability included: autism (n = 8), intellectual disability (n = 3), learning disability (n = 3), multiple/severe disabilities (n = 3), cerebral palsy (n = 3), physical impairment (not defined) (n = 3), hard of hearing/Deaf (n = 2), and sensory disability, emotional disorder, ADHD, visual impairment, obese, muscular dystrophy, and 4H syndrome (each reported once). Participating teachers also reported on challenges they experienced in including the identified tutee. Challenges included: lack of engagement/off task behavior (n = 16), social issues (n = 7), motor skill/fitness deficits (n = 6), an inability to follow/understand directions (n = 5), and the students' need for one to one instruction (n = 4). Some teachers reported more than one challenge.

At three points during course completion, teachers were directed to complete "application activities," and, guided by prompts, self reported on their level of completion of the application activities. Self report measures are divided into two components and each was evaluated separately to determine the effectiveness of the program. Teachers reported on:

(a) Preparation: Teacher completes essential activities pertinent to preparing for the peer tutoring program including choosing a tutee and a tutor, and implementing a class preparation activity. Four points in total were allocated for preparation activities.

(b) Training: Teachers choose roles for their tutors; ranging from just providing feedback to the tutee, to instructing and implementing motivational strategies for the tutee. A total of 7 points were available for training activities. For a program to be defined as a "program with trained tutors," teachers were required to complete a minimum of three training activities.

Assessment of participant's implementation resulted in five "levels of implementation":

(1) A prepared program: teachers have completed all 4 preparation activities.(2) A program with trained tutors: teachers have completed a minimum of 3 training activities.

(3) A prepared program with trained tutors: teachers have completed all preparation activities and a minimum of three training activities.

(4) Partially completed program: teachers have some activities completed, not sufficient to meet the criteria for other "levels of implementation." For example, teachers who just prepared the class for peer tutoring would be included in this level.

(5) No implementation completed: teachers did not complete any implementation activities.

Thirty-six participants completed the course ( > 65% of course content consumed) at the time of data analysis. Sixty five percent of course completion was deemed an adequate minimum requirement as 65% of content was

necessary for the implementation of a basic peer tutoring program. It resulted that participants completed a mean of 92.18% (SD = 9.6) of the OPD course with a range of 69% to 100%. Self report showed that 22% (n = 8) of participants completed all the steps required for preparation and training for the peer tutoring program. Eleven percent (n = 4) of participants completed preparation activities but did not report on completing training activities with tutors. One participant completed training but did not report on completing a preparation activity. Thirty-three percent (n = 12) of participants completed some of the preparation and/or training activities but not sufficiently to meet the requirements of an effective program.

To gain a greater insight into the characteristics of the teachers who implemented all activities (n = 8) comparing to individuals who completed some or none of the course's activities (n = 28), chi-square analysis was conducting on all demographic variables. Results showed teachers significantly differed only on their motivation for course completion,  $\chi^2(1) = 4.19$ , p = .041. The motivation for 66.7% (n = 6) of teachers who implemented the course activities was a desire to implement peer tutoring. Conversely, only 28% (n = 7) of the teachers who did not complete all application activities stated a desire to implement peer tutoring as their motivation for completing the course.

For triangulation of self report data, audio recording of implementation activities was suggested to teachers, but not required. Two teachers stated they could not audio record their implementation. In addition one large school district stated that permission was not granted for their teachers to audio record lessons for research purposes. All but one teacher choose or were compelled to not audio record their activities. One teacher successfully audio recorded two of her implementation activities. The female teacher had 31 years of teaching experience and taught in an elementary school. Her motivation for completing the course was the desire to implement a peer tutoring program. The teacher had completed a Masters in Physical Education and Health and was not certified in adapted physical education. She had previously used untrained peer tutors in her class. The tutee that the peer tutoring program was planned for was an 8 year old male with autism. The teacher noted that his low motor ability and the need to provide him with one-to-one attention was the greatest challenge faced in including him. The teacher chose to use a rotating-group peer tutoring format. Upon receipt of this audio recorded, it was transcribed and evaluated using the self-report rubric (Appendix P). The two audio recordings depicted a teacher conducting two training session with three students. The tutee was not present. Analysis showed 71% agreement between self report and audio recorded data. Audio recordings and self-report data depicted that the teacher trained her students in their roles, rules, providing feedback and motivation, and scenarios were used. However, the audio recordings did not demonstrate that the teachers trained the tutors in providing instruction or motivational strategies, although this was self-reported on.

Participants who choose not to implement the activities were asked to provide a rationale for their decision. Reasons for lack of implementation included: intention to begin implementation in the Spring (n = 3); inability to identify suitable tutors (n = 3); desire to learn the content prior to implementation (n = 2); and, lack of time for implementation (n = 2). In addition,

two teachers who worked as itinerant adapted physical educators noted that they plan to teach physical educators that they collaborate with to implement peer tutoring. Finally, six teachers did not provide a detailed rationale, just citing that they were "Not yet" ready to implement the program. The null hypothesis for question two was that the OPD would have no effect on a teacher's ability to implement a peer tutoring program. As a result of eight (n = 22.2) of teachers reporting that they implemented all activities, the null hypothesis was rejected. The OPD course can enable physical educators to implement a peer tutoring program.



Figure 5. Implementation of preparation and training activities

# **RQ 3:** How do physical educators perceive the online environment as a setting for professional development?

The Perceptions of Professional Development survey involved participants responding to a series of 11 statements related to the perceived usefulness of and satisfaction with the online course. Participants responded on a scale of 1 to 4 with 1 indicating strongly agree and 4 indicating strongly disagree. Two items were negatively phrased and thus, were reverse coded prior to analysis. In addition, participants were asked four open-ended questions to gain greater insight into their perspective of the course. Fifty-three percent (*n* =19) of teachers completed the Perceptions of Professional Development Survey. Results show that overall perceptions were very positive; on average 64.9 percent strongly agreed or agreed that they course was beneficial and effective. More specifically, over 70% of respondents strongly agreed or agreed that they would use the strategies learned in the course to implement peer tutoring in their classes. A full overview of responses is presented in Table 10.

A clear dichotomy can be seen between teachers who perceived the OPD as being positive and those who view it as being less favorably. To gain greater insight into the characteristic of the participants who responded negatively to the items, demographic variables were compared between individuals who viewed the course positively (M < 2.5 which corresponds with strongly agreeing or agreeing with the statements) and individuals who viewed the course negatively (M > 2.5, which corresponds with strongly disagreeing or disagreeing with the statements) using a chi square test. However, no significant differences were shown to exists between groups on the demographic variables (p > .05).

Description of the Perceptions of Professional Development Survey Items Between Groups

	Strongly										
Variable	Respondents (n)	М	SD	А	gree	A	lgree	Ľ	Disagree	Strong	y Disagree
				n	%	n	%	n	%	n	5
Interesting	20	2.15	1.42	11	55	2	10			7	35
Organized	20	2.10	1.45	12	60	1	6			7	35
Helpful	20	2.15	1.42	11	55	2	10			7	35
Boring	19	2.05	1.31	5	25	1	5	3	15	10	50
Informative	20	2.10	1.42	11	55	2	10			7	35
I learned a lot	19	2.1	1.24	8	40	6	30			5	25
It wasn't worth the time it took	19	2.05	1.31	5	25	1	5	3	15	10	50
Would recommend	20	2.2	1.39	10	50	3	15			7	35

to a colleague											
I will use the											
strategies learned											
in the course to	20	1.90	1.29	12	60	3	15			5	25
implement PT in											
my class.											
I enjoyed											
participating in the	20	2.15	1.31	9	45	5	25			6	30
training											
The video podcasts	20	2.05	1.27	10	50	4	20	1	5	5	25
were effective											
#### **Disadvantages of the OPD**

Three open questions were also posed to get a more in-depth understanding of the participant's perception of the PD course. First participants responded to the statement: "What I like least about this professional development was...". Five themes emerged from participants' answer. The most prevalently noted issue was related to data collection (n = 5). This included issues related to the survey; for example one participant displayed dissatisfaction with "not being able to go back to the survey if not finished." Issues related to data collection in the class also arose; "recording myself in class," and displeasure with having to be on the wait list prior to beginning the course; "having to wait 2 weeks before I could begin the course." Concerns related to technology were also voiced (n = 4). For example one participant noted how they "could not log onto more than one computer to complete the training" and another participant who was displeased with the "userfriendliness" of the learning platform; "The notes on the side were tough to adjust to at first because you couldn't write them like regular notes and had to just keep making new 'thoughts' essentially so this made the notes within each section disconnected from each other even if you tried to make a list." Instruction was another identified element of dissatisfaction (n = 5). This theme included a wish for more videos of peer tutoring, noted by two participants; "I would like to see actual peer tutoring videos as part of the training", and comments on the general nature of the course by two teachers; although one of these teachers did note that "by necessity, it was general in nature" Two teachers noted issues

related to time as being problematic with one teacher commenting how they were "interrupted often by job obligations!" and another stating that "It was difficult to get the time to watch the podcasts." Finally, three teachers reported "nothing" or neglected to provide an answer for this question.

#### Advantages of the OPD

Participants were then asked to respond to the statement "What I liked best about this professional development was...". Three themes emerged from participants' responses. Eleven participants noted elements related to instruction as been an effective element of the PD course; this primarily related to the content, which was deemed practical, relevant and easily applied, as summarized by one participant who said "It gave some good tips and strategies for working those with disabilities. It raised awareness of a more organized use of peer tutoring and gave a framework for success/" This benefit was reinforced by other teachers; for example, one teacher noted, "The information was relevant and can be easily applied," and another who noted that the content was "Very on target with my daily profession." The clarity of information presentation was also identified as being a strength of the course, with teachers noting that "each lecture was to the point and informative." The second theme related to aspects of the learning platform, which was a theme that encompassed the responses of nine participants. This theme includes the flexibility afforded to teachers; the flexibility for teachers to self pace their learning was especially beneficial as reflected in the quotes from two teachers, who enjoyed the "ability to take the course at my leisure and at home for the most part," and another teacher who

expressed the importance of this flexibility for teachers said, "I could complete it on my own time schedule which proved to be uneven at best between school commitments and weather delays. I liked that I could go back and reacquaint myself with information when needed." The teachers also benefited from the format of the learning platform, as articulated by one participant; "I liked that it had stopping points, downloads, options to upload videos, a notes section, etc. It was very well organized."

## **Reasons for Lack of Implementation**

The third question posed the question; "if you did not implement the activities from this course, please provide a rational." The participants' responses to this question were detailed previously, as they related directly to research question 2, implementation of the lessons learned.

Teachers were also encouraged to provide other comments on the PD course. Very positive responses were provided, related to the online environment as a setting for PD, "I had never taken a class using a podcast and I think it has potential to reach many" and a desire to complete future similar courses in the future, "Thank you for this opportunity. I have wanted to try peer tutoring for a long time but did not find a course worth taking. This was excellent" and "Thank you for a great professional development and I hope to take part in another one soon." The null hypothesis for this research question was that physical educators would perceive the online environment as an ineffective setting for professional development? Due to the quantitative and qualitative data providing evidence for the OPD course as an effective setting for professional development, the null hypothesis was rejected.

## **Course Drop-out**

Twenty-nine teachers dropped out of the course, at the time of analysis, as defined by completed less than 65% of the course. This group of teachers completed a mean of 19% (*SD* = 15) of the course, with a range from 0 to 58%. Demographic data was available for 10 of these individuals. Analysis were conducted to compare the characteristics of teachers who completed the course at the time of data analysis (n = 36) and the teachers who entered the course but failed to complete the course for whom demographic data was available (n = 10). Independent T-tests were calculated to assess the difference between groups on years of teaching experience. No significant differences emerged between groups; t(39) = -.805, p = .426. Chi Square analysis revealed that training in APE differed significantly between individuals who dropped out and individuals who completed the course. In the drop-out group, 54.5% (n = 6) of teachers held a masters in APE as their highest level of training in APE; this showed to significantly greater than the group who completed the course, in which 13.9% (n = 5) held a masters in APE as their highest level of training in APE,  $\chi^2(1) =$ 7., p69 = .005. This result was further compounded, as it emerged that 27% (n = 3) of individuals in the "drop-out" group had one or two undergraduate courses in APE as their highest level of training in APE, which was significantly less than the 72.2% (n = 26) of teachers in the "completion" group who stated that one or two undergraduate course in APE was their highest level of training in APE,  $\chi^2(1)$  = 7.204, p = .007. This result demonstrates the teachers' level of training in APE influenced their decision to complete the course, and showed that teachers with less training were more likely to complete the course.

Chi square analysis also revealed that teachers who taught in high schools were more likely to drop out. In the drop-out group 54.5% (n = 5) of teachers were high school teachers, which differed significantly from the "completion" group, in which there were no high school teachers,  $\chi^2(1) = 8.312$ , p<.001.

# Table 12

# Comparison of teachers in "completion" versus "drop-out" group

		Drop-out	Cou	rse complete			
		( <i>n</i> = 10)		( <i>n</i> = 36)	_		
Demographic Variable	n	%(within)	n	%(within)	df	$\mathbf{X}^2$	Р
Females	6	54.5	22	61.1	1	.151	.698
Male	4	36.4	14	38.9	1	.023	.88
Certified APE	3	30	8	23.5	1	.173	.678
Highest level of							
Education:							
Bachelor	2	18.2	8	22.2	1	.082	.774
Masters	8	72.7	27	75	1	.023	.880
Motivation for course							
completion:							
Want to implement PT	23	27.3	15	41.7	1	.739	.390
Want to learn about PT	5	45.5	13	36.1	1	.311	.577
Want to earn CEU	2	18.2	4	11.1	1	.378	.539
Exp. In using PT:							
Used untrained PT	3	27.3	17	47.2	1	1.372	.242
Used trained PT	2	18.2	3	8.3	1	.860	.354

Did not use PT	5	45.5	15	41.7	1	.049	.824
Teaching Situation:							
Elementary	4	36.4	21	58.3	1	1.633	.201
Middle	1	9.1	4	11.1	1	.036	.849
High	5	45.5	0		1	18.312*	.000
Other	1	9.1	4	11.1	1	.036	.849
Highest level of APE							
training:							
No training	1	9.1	3	8.3	1	.006	.937
1/2 undergrad courses	3	27.3	26	72.2	1	7.204*	.007
Masters	6	54.5	5	13.9	1	7.769*	.005
Other	1	9.1	1	2.8	1	.824	.364

# DISCUSSION

Physical educators are faced with a plethora of challenges in including students with disabilities (Ammah & Hodge, 2006; Hardin, 2005; Linert, Sherrill, & Myers, 2001; Qi & Ha, 2012). Educational reform in the area of inclusive physical education is required. "Professional development is essential to this educational reform and its ultimate success" (DeMonte, 2013, p.2). However, traditional PD for physical educators is hindered by cost, time, location and availability (Armour & Yelling, 2007). OPD may provide a solution, with benefits including flexibility of time and place for the teacher, access to experts and resources otherwise unavailable, and more scalable than PD that depends on local resources or non-online training (Dede, Jass Ketelhut, Whitehouse, Breit, & McCloskey, 2008). However, to date, research has not explored the potential of OPD to enable physical educators to better include students with disabilities. Regarding course content, peer tutoring was chosen as the content of choice as it provides affordable support to the physical educator and has shown to provide learning and social benefits for the tutee and tutor (Houston-Wilson, Lieberman, Horton, & Kasser, 1997; Ward & Ayvazo, 2006, Klavina & Block, 2008). Therefore, the purpose of this study was to determine the effectiveness of an OPD course to enable physical educators to implement a peer tutoring program in their classes. Specifically, the study sought to determine if an OPD course provided physical educators with increased knowledge about, and perceived ability to implement,

peer tutoring and do the teachers perceive the online environment as a satisfying environment to receive professional development?

This section is organized into three section; (a) discussion, (b) limitations and implications, and (c) conclusion. This discussion includes: (a) an examination and interpretation of the knowledge increase that was revealed in the quantitative data analysis, (b) implementation results and confounding issues, (c) attrition in OPD, and (d) the importance of, and challenges related to social interaction in the online learning environment.

#### Effects of the OPD on Teachers' knowledge of Peer Tutoring

The online PD course showed to be very effective in increasing the knowledge of participants who received OPD relative to the teachers in the wait list control group, as revealed by a Split-Plot ANOVA analysis; Wilk's Lambda = .454, F(1,41) = 49.282, p < .001,  $\eta^2 = .546$ . Partial eta-squared describes the "proportion of total variation attributable to the factor, partialling out other factors from the total non-error variation" (Pierce, Block & Aguinis, 2004, p. 918). Therefore, 55% of the variance in this model can be attributed to the interaction between time (pre-test to post-test) and group (experimental versus control). Furthermore, a repeated measures ANOVA on the combined group scores at pre-test, post-test and retention demonstrated that learning was also retained; Wilk's Lambda = .15, F(2,11) = 30.38, p < .001,  $\eta^2 = .847$ , with follow-up comparisons indicating that the pairwise difference was significant between pretest and post-test (p < .001) and pre-test and retention (p < .001) but not between post-test and retention (p = .126). Such positive results are not

surprising, as the OPD in this study was designed and created with a considered and strict adherence to theories of learning and instruction that have previously shown to effectively contribute to learning. First, Mayer's principles, derived from the Cognitive Theory of Multimedia Learning, were applied to the course and ensured presentation of content was evidence based, thus maximizing learning. Application involved Mayer's ten principles of instructional design being used to create a series of short podcasts. This ensured: (a) extraneous processing- cognitive processing that does not support the instructional goalwas reduced; (b) essential processing required for receiving information was managed; and (c) generative processing was fostered so as the learner could make sense of the incoming material, including organizing it and integrating it with prior knowledge (Mayer, 2005). Results from the perceptions of professional development survey support the use of CTML-based podcasts in this OPD with 66.6% (n = 12) of respondents strongly agreeing or agreeing that the podcasts were effective. The effectiveness of podcasts, influenced by Mayer's principles, reflects previous OPD research on their use. For example, Kennedy (2011) used enhanced podcasts, designed using CTML principles, to effectively provide knowledge about education for children with disabilities to preservice teachers. Two randomly assigned groups of undergraduate teacher education students used either audio podcasts or enhanced podcasts, similar to those used in the present study. Researchers measured recall and higher order application ability of students, using a test of open and closed questions, to determine which content delivery method was more effective. Results showed CTML based podcasts to be more effective than audio delivered material alone, with a

medium effect size. Similarly, Kennedy and Thomas (2012) demonstrated that CTML-based podcasts were more effective than text-based learning resources in providing preservice teachers information about behavioral supports, with a large effect size. The present study reinforces the effectiveness of the CTML as a foundation for OPD podcasts. In addition, it extends on previous research by demonstrating how a series of CTML-based podcasts can be combined to create a comprehensive OPD resource, and demonstrates the use of CTML for in-service teachers.

The positive quantitative results in this study also may be a result of the application of Adult Learning Theory (ALT) principles to the course design. This was done as the PI recognized that as well as ensuring theoretically sound delivery of material, the content and courses structure required an evidencebased framework also to maximize the likelihood of success. Adhering to ALT principles served to motivate teachers to attend to the material by ensuring it had immediate relevance to their situation and was presented based on an identified problem. Results from the perceptions of professional development support the importance of immediate application with several teachers identifying this as "what they liked best" about this professional development experience. In addition, 11 participants noted elements related to instruction as been an effective aspect of the OPD. The positive results demonstrated in this study reflect previous research in which ALT principles were applied to OPD. For example, research by Quinney, Smith & Galbraith (2013) provided details on how ALT principles were applied to an asynchronous OPD for ninety-six library staff. Application of the principles to the course paralleled the application to the

OPD course in the present study, including choice of implementation activities, the ability to self pace, reflections on real work challenges and the presentation of material that was directly applicable to their work. According to the exit survey on participants (n = 64) perceptions of the PD, the course did align with the principles of ALT; in addition, participants noted that they particularly enjoyed the ability for self-direction of learning, use of previous experience, and the ability for immediate application of the course's. Although absence of a control group make findings difficult to interpret, the research did conclude that learning was successful lessons (Quinney, Smith & Galbraith, 2013). Theoretical frameworks for OPD is lacking in the literature, and frequently, when a theory is identified, its application to the course is lacking evidence. For example in research by Bishop (2006) the application of ALT principles to a language course consisted of application of principle one only - students having responsibility of the materials used for learning. Similarly, Woodward (2007) stated that ALT principles were applied to a training program for newly-hired employees in industry; however, no details on the method of this application were provided. Despite the appeal for theory-based online learning (Ally, 2008; Anderson, 2004; Miller & Miller, 2000; Richey & Klein, 2007), traditional instructional methods, without a theoretical foundation, prevail in online learning design and implementation (Richey & Klein, 2007). The application of CTML and ALT to this course overcomes this failing of previous research.

In summary, the results of this study highlight the potential of online resources created based on CTML and ALT principles to effectively provide physical education teachers with knowledge related to the inclusion of students with disabilities. Althou1gh content related to peer tutoring can be found elsewhere (for example articles and textbooks), this course provided this information in a systematic, accessible and engaging platform. Using videos for education purposes has been shown to increase learning (e.g. Kennedy et al, 2014), increase engagement (Buch, et al., 2014), and more effectively highlight key information (Ellis & Childs, 1999) when compared to text based learning. In addition, this course can be offered at a low cost, demanding little time from the instructor, and made scalable to a large number of teachers regardless of location. Additional research is required to replicate these findings and determine if this method of content delivery may be the optimal method for the asynchronous delivery of future OPD for physical educators. Specifically comparisons with other content delivery methods should be conducted related to implementation of content to the classroom, and cost efficiency."

#### **Implementation results and confounding Issues**

The aim of online professional development is to extend beyond knowledge transfer to ultimately improve practice in the classroom (Banks & Shelton Mayes, 2001). Prior research has sought to evaluate the ability of teachers to apply lessons learned in OPD to their classes using several methods. For example, Masters et al. (2010) employed self-report data collection methods to assess teachers use of instructional strategies related to vocabulary instruction; Powell et al. (2010) used audio recording to assess the effectiveness of a literacy-focused PD intervention; Fishman et al. (2013) used video recording to determine high school teachers ability to implement a year-long environmental science curriculum; and Fisher et al. (2010) used teacher observation to examine teachers' use of Concept Mapping. The present study evaluated application of lessons by requesting teachers to self-report and audio record their class activities; this was an effort to overcome the lack of triangulation that is a common limitation in previous studies involving teachers self reporting on application activities (e.g. Masters et al., 2013). Self-report showed that 22% (n = 8) of participants completed all the steps required for preparation and training for the peer tutoring program. Eleven percent (n = 4) of participants completed preparation activities but did not report on completing training activities with tutors. Thirty-three percent (n = 12) of participants completed some of the preparation and/or training activities but not sufficiently to meet the requirements of an effective program. We may speculate as to the reasons for the varying levels of application.

One means to understand the teachers' varying application of the OPD lessons is to compare teachers who did and did not complete course application activities to identify individual differences. Chi square analysis revealed that teachers' motivation to complete the course correlated with implementation of the course lessons. The motivation of a "desire to implement peer tutoring" was the primary motivation for 66.7% (n = 6) of teachers who implemented the course activities, in comparison to 28% (n = 7) of the teachers who did not complete all application activities,  $\chi^2(1) = 4.19$ , p = .041. The theory of planned behavior may assist us in understanding this phenomenon; this theory states that attitude toward the behavior, subjective norms, and behavioral control contributes to shaping one's intentions and behavior (Ajzen, 1991). The teachers' attitude toward inclusion and the use of peer tutors, as well as their perceived behavioral control of utilizing peer tutors, may have impacted on their intentions to apply the OPD lessons to their classes, ultimately influencing their behavior. Indeed, previous research has demonstrated how teachers' intentions to apply professional development lessons was governed by their intention to do. For example, Patterson (2001) demonstrated how the behavioral intentions of 23 teachers participating in a microbiology professional development was a significant predictor of actual behavior. Moreover, Patterson demonstrated that the attitudes toward incorporating the activities of the PD significantly influenced the teachers' decision to apply them. Indeed such findings are not new and reflect previous research (e.g. Crawley, 1990, Haney, Czerniak, & Lumpe, 1996) that demonstrates that teacher' beliefs are the primary determinant of their intention to apply lessons learned in professional development. In the present research the use of problem centered learning (e.g. encouraging the teacher to identify a challenge they experience in including a student with a disability), the first podcasts that focus on the benefits of peer tutoring, and the opening video showing successful peer tutoring in action, were an effort to shape the teachers' belief toward the usefulness of peer tutoring, thus affecting their intention to apply this strategy. Future courses should include an increased focus on attitude change toward specific strategy use, and not solely present the strategy to the teacher. Capitalizing on the importance of social norms may also assist with this; for example through testimonies from teachers on the effectiveness their peer tutoring programs.

Another factor that may impact on the choice of some teachers to not apply the lessons learned in the course may relate to the fact that application of activities was not required for course completion. This choice was an element of their self directed learning, a concept at the center of ALT, that affords the learner personal responsibility for their learning and application of learning (Brockett & Hiemsta, 1991). In previous research, when application of course activities was being assessed, application was compulsory for research participation. Moreover, when application was required it tended to serve as an integral part of the OPD experience. For example, research by Powell et al., (2010) required teachers to submit a videotape of their application of the PD lessons for a coach to review. The teacher then received this video back with feedback from the coach. Such practices would have encouraged the teachers in the present OPD to apply the lessons learned. Future research on this OPD should place the application of course activities at the center of the course and teachers should receive feedback on their reports. In addition, future research on OPD for physical educators relating to inclusion should examine the effect of required application of OPD lessons versus voluntary application.

An examination of the characteristics of the teachers who completed all course activities is worthwhile, as it may provide insight into the sample for whom the course was most effective. The increase in content knowledge test scores for teachers who completed all implementation activities showed to be not significantly different from the teachers who did not implement all the course's activities (p = .32). The majority (n = 6) of teachers who completed all activities were female, and had a high level of teaching experience (n = 19.3). The

motivation for these teachers, to complete the OPD, was predominantly a desire to implement peer tutoring (n = 6). Interestingly six of the teacher who completed all implementations activities completed 100% of the course, with the two remaining teachers completing 79% and 85%. Regarding their perception of the online OPD course, qualitative data was available for five teachers who completed all course activities. Elements of the course that they most liked related to the flexibility of the course (n = 2), the practical and relevant information (n = 2) and one teacher noted that the information reinforced her prior knowledge. Regarding aspects of the course disliked by participants, technological issues were cited by two participants and finding the time to completed the OPD was stated as being least liked by the remaining teachers. Due to the small sample size, inferences about the characteristics of teachers most likely to implement OPD activities cannot be made. Future research should seek to rectify this by utilizing a larger sample and collecting more in-depth qualitative data specifically related to implementation of course content.

It is also worth examining the rationale providing by the teachers who chose not to implement activities. Interestingly, the responses of over half (n =11) of the teachers who completed some or none of the implementation activities, alluded to an intention to implement the peer tutoring in the future, citing that they were "not yet ready to implement" (n = 6), planning to implement in the Spring (n = 3), or wanted to learning the content first before implementation (n = 2). In addition, two itinerant adapted physical educators spoke of how they planned to train physical educators they collaborated with on the strategies learned in the course. This is reflected in the perceptions of professional development survey responses as over 70% (*n* = 13) of respondents noted that they either strongly agree (57.1% n = 11) or agree (14.3%, n = 2) with the statement, "I will use the strategies learned in the course to implement peer tutoring in my class." In addition, many teachers completed the course during the winter break period, limiting application opportunities. To promote immediate application of OPD lessons, consideration of timeframes within which courses are offered must be a consideration for future OPD facilitators. Time has been noted a one of the most influential barriers to PD (Strizek, Tourkin, & Erberber, 2014). While the asynchronous nature of OPD may allow for flexibility of completing the course, the inflexible and overburdened school timetable would not present the same luxury for application of the course's activities. Indeed a lack time has arisen as a barrier to application of OPD lessons in previous research. For example, Powell et al. (2010) assessed the effects of three learning-community models of OPD on instructional practices of English language teachers. It was noted that the teachers' ability to implement the course's activities was limited due to the lack of time given to the teachers to complete the course and participate in application opportunities. As teachers of the present OPD completed the course in the months of December and January, the influence of the winter break and the demands of beginning a new semester may have impacted on application opportunities.

When application of the course's lesson did occur, teacher were encourage to audio recording the activities so as self-report data could be triangulated. Audio recording has previously been successfully used to assess the ability of teachers to apply lessons learned in OPD courses. For example, Powell, at al., (2010) successfully used audio recording of teachers to assess the effects of a literacy-focused PD intervention. However, in contrast to this study, Powell employed researchers to audio record teachers and it was a requirement for study participation. Providing the teachers of this study with a choice to audio record their application activities proved ineffective. Two teachers contacted the PI and stated that they were unable to audio record their classes. In addition it emerged in the perceptions of professional development survey responses as being an element that was "least liked" by participants. In addition, a large school district refused to provide permission for their teachers to audio record any class activities. Other school districts or individual schools may have imposed similar limitations unknown to the researcher. However, one teacher did audio record her application and therefore the PI could successfully triangulate their self report data. This allowed for an examination of the fidelity to which implementation occurred for this teacher and demonstrates the potential of the coupling of self report and audio recordings. Future efforts must be made to more effectively combine these two methods of data collection.

### **Challenges of Online Education**

Attrition. Online education is a contentious issue; proponents cite advantages such as flexibility for the learner of time and place, lower cost, less demand for resources such as space, and potential for scalability (Valian & Emami, 2013). Conversely, critics warn against higher rates of attrition (Stanz & Fourie, 2002) and a reduction in the opportunities for social interaction (Njenga & Fourie, 2010) Research suggested online education attrition rates of 30% to 50% (Stanford-Bowers, 2008). Research on OPD revealed even higher levels for attrition. For example, results from research by Masters et al. (2010) on OPD for English teachers were limited by over 60% (n = 157) of participants not completed all research requirements. Reasons given for not completing all requirements included personal conflicts, changing assignments and careers and becoming uncommunicative and therefore not providing a rationale for dropping out. To avoid similar limitations, the PI of the present study engaged in multiple efforts to reduce attrition rates, and when attrition then occur, the PI sought to use the demographic data to understand the characteristics of teachers who did drop out. Twenty-nine teachers dropped out of the course at the time of analysis. The reader is reminded that this was defined by completing less than 65% of course content; this was deemed adequate as a teacher could consume 65% of course content and implement an effective peer tutoring program. Teachers in the "drop-out" group completed between 0% and 58% of course material,  $(n = 1)^{10}$ 19 SD = 15). This was in contrast to the 36 teachers who in the "completion" group who completed a mean of 92.18% (*SD* = 9.66) of the course content with a range of 69% to 100%.

A comparison between "drop-out" and "completion" groups revealed interesting results. In the "drop-out" group, 54.5% (n = 6) of teachers held a masters in APE as their highest level of training in APE; this showed to be significantly greater than the "completion" group, in which only 13.9% (n = 5) held a masters in APE as their highest level of training in APE,  $\chi^2(1) = 7.769$ , p = .005. This finding may suggest that the teachers who had masters in APE realized that the course did not offer them new information and therefore was not relevant. Alternatively, some of the individuals who hold a masters in APE may be itinerant teachers within schools or between schools. This may result in the teacher not being in a situation to complete the activities from the OPD; thus, perceiving the OPD as not being relevant to their work causing them to dropout. In addition, the comparison showed that teachers who taught in a high school were more likely to drop out. In the "drop-out" group 54.5% (n = 5) of teachers were high school teachers, which differed significantly from the "completion" group, in which there were no high school teachers,  $\chi^2(1) = 8.312$ , p < .001. Again, this may be due to a perception that the course material was not relevant. As the course was originally designed for elementary and middle school teachers, the first section of the course primarily presents examples that relate more to elementary or middle school physical educators' daily practice. It is not until the third section of the course that examples got more complex, and perhaps more relevant for high school physical educators-for example content involved a discussion of training the tutor to implement a token economy. Perhaps high school teachers had a tendency to drop out based on their experience in the first section of the course, due to feelings that the course was not applicable to their work situation; thus, ALT principles were not upheld for this group of teachers. Future courses on peer tutoring should be specific to school level, thus provided strategies and example that are more relevant for the teacher. Previous research supported this presumption. A review (Park & Choi, 2009) of factors influencing drop out for 147 adult learners from online courses from a large Midwestern University revealed that learners were less likely to drop out when the courses were relevant to their own lives. This was reflected in previous research (e.g., Levy, 2007; Doo & Kim, 2000), which revealed that

relevance to learners' job, prior knowledge, and experiences were major factors affecting their decision to drop out or persist. Online education facilitators have designed learning platforms to overcome this barrier to course completion. For example Ohio University offers students a choice of learning formats, as well as choice of training modules to suit the learning needs of the students. Similarly, Stanford University offers students a choice of tutorials which allow the students to extend their knowledge depending on their interests and needs (Swan, 2003). Adopting more individualistic instructional methods and content into this OPD may have helped alleviate the tendency for teachers with a high level of training in APE and teachers in high school to drop out. It should be noted that a number of efforts were made to reduce attrition in the present study including:

- The application of ALT principles (as successfully done previously, e.g. Quinney, Smith, & Galbraith, 2013) sought to ensure the content was relevant, immediately applicable to the teachers work, and centered on a problem identified by the teachers.
- Research (Swan, et al., 2000, Richardson & Swan, 2001, Jiang & Ting, 2000) revealed a correlation between students' perceptions of satisfaction and learning, and their perceived interactions with instructors. To capatilize on this, the PI interacted with the teachers at various time periods: (a) upon entry to the course teachers were welcomed and invited to contact the PI if assistance was ever required; and (b) at two time periods during course completion, teachers were contacted, informed of the percentage of course material they had completed, and encouraged to continue. This contact was personal ensuring names were used and information provided by the teacher in previous contact was referred to when appropriate to develop the teacher-student

relationship (for example topics such as weather, school activities, sport, etc).

- The five CEUs on offer for course completion were divided up and the teacher "gained" CEUs at various stages of course completion. This approach was done to incentivise the teachers who noted the CEUs as being their primary motivation for course completion. Quinney, Smith and Galbraith (2010) used a similar approach providing the learners of their OPD with points for participation in various course activities, with a minimum number of points set for successful completion of the course. The use of incentives to maintain engagement should be included in future OPD and its effect assessed.
- Results from an analysis of Massive Open Online Courses (MOOCs) revealed that students generally stopped watching videos after 6 minutes; the median time spent watching a video was 4.4 minutes (Fowler, 2013). The course content in this OPD was presented in four short sections, each comprising of a series of short video podcasts; all under 5 minutes in length. As well as increased engagement, this allowed the teacher to complete the course in short periods of free time which may suit teachers' busy schedules. Such benefits of using short videos for OPD reflect previous research, such as Fishman (2013) who used a series of self-paced "short courses" to train teachers in delivery of a science curriculum.
- The course encouraged teachers to implement the steps for peer tutoring in three stages; therefore not overloading the teachers with too many demands and offering many opportunities for success. This was reinforced when teachers reported on their successful implementation before starting each new section.

**Social Interaction.** Recent research by Healy, Judge and Block (2015) on APE specialists' perspectives of the advantages and disadvantages of online learning, resulted in the emergence of a dichotomy of teacher opinions on the effect of online education on social interaction. Some teachers noted that OPD offered them the opportunity to join a community of learners they otherwise would not have the opportunity to join. Conversely, others voiced concern about the lack of social interaction on some online courses. Much literature exists on the important of fostering a virtual community of learners in online education courses (Brown, 2001; McCluskey, 2002). Rovia (2002) examined the effectiveness of the online education as a setting for the creation of a community by comparing 14 traditional and asynchronous online courses for adults. The components of community examined were spirit, trust and learning. Rovai found no significant difference between both environments in overall sense of community. However there was more variability in the sense of community in the online environment, which prompted the conclusion that the online community is dependent on course design and pedagogical factors. The design of the OPD in this study lacked the design conducive to the creation of an online community. Although, teachers were encouraged to enter the course forum once; to respond to the question: "What challenges do you experience in including students with disabilities in your classes?", teachers were not encouraged to interact or respond to one another. This was largely due to the fact that the forum available for use on the learning platform was inefficient, and therefore it was decided that emphasis would not be placed on learner to learner interaction. Instead, the forum was viewed by the PI as a tool for increasing group

cohesiveness, whereby the teachers could witness how other teachers faced similar challenges in including students with disabilities. Indeed other research on OPD took a similar stance; neglecting to use a forum to establish an online learning community; for example, research by Fishman et al. (2013) examining the effectiveness of OPD for science teachers, did not encourage the teachers to enter a forum and interact with other teachers despite the facility being available on the learning platform.

On reflection and after analysis of the forum use in this course by teachers, the PI highly recommends more emphasis be placed on encouraging learner to learner interaction in future professional development courses. This is due to the fact that despite no encouragement or incentive for learner to learner interaction in this course, it occurred naturally on the course's forum. The following online dialogue between two participants provides an example of how the forum served as a virtual space for student interaction and support: Teacher 1:

"No time for 1-on-1 is definitely a challenge. I get very nervous when these students have to be put in game situations and do not understand. Not only is their safety in jeopardy but other students in the class get mad at those students cause they aren't helping to win." Teacher 2 reply:

"I would try to change the climate/culture of the class so they don't get mad at the student who doesn't help them win. I don't keep score when we play games. I try to be non-competitive. We also have a lot of class discussions when I feel they are not demonstrating good sportsmanship. Maybe this course will give us some good options for developing empathy."

The informal learning that occurs in PD has been noted as a key learning opportunity in PD (Armour & Yelling, 2007). Research has demonstrated that this be replicated in OPD courses for teachers. For example, the OPD studied by Masters, et al. (2010) demonstrated the success of three OPD workshops designed around a learning-community model of education. The interaction between participants was fostered by requiring teachers to respond to questions posed by the instructor and respond to at least one other teacher's discussion board response. The interaction on the forum in the course used in this study suggested that the online environment may also be a setting for physical educators to interact around issues of inclusion. With encouragement and incentives for learner interaction, as well as an efficient online forum facility, this could prove to be a major benefit of the online environment for enabling physical educators to address and collaborate on issues surrounding inclusive education.

#### Limitations and recommendations

A numbers of limitation arose in the course of conducting this study. Although the actual sample size exceeded the target size for the Split Plot analysis used to evaluate knowledge increase from pre-test to post-test, this number was reduced to 13 for the retention. It was seen that several teachers began the retention survey but exited prior to completion. The perception of professional development survey highlights a possible cause for this as teachers identified the length of the survey as being too long. In addition, the survey platform was problematic for some teachers as they reported that they could not re-access their partially completed surveys. Further studies should seek to build assessment into the online course thus removing the necessity for teachers to navigate between online platforms. In addition, assessment items should be created cognizant of the fact the teachers are under severe time constraints; research on the reasons for dropout across 16 studies on OPD of university faculty members revealed that lack of time was identified as one of the primary reasons for attrition in over 40% (*n* = 7) of studies (Sener & Hawkins, 2007). This has proved to be a limiting factor in previous OPD research also (e.g. Powell et al., 2010). Methods of assessing fidelity of implementation must also be implemented. When done correctly, the combination of audio recording and self report data showed to be effective in assessing the teacher's ability to implement the course lessons. However, numerous challenges prevented the majority of teachers employing this data collection method. In the future additional efforts must be made to encourage teachers to audio record their implementation of PD lessons. It is also recommended that this study be replicated using video or direct observation to evaluate teacher behavior.

Additional variables should be examined in future studies to provide further insight into the effectiveness of this OPD course. Additional dependent variables could be assessed related to the tutee's experience in the peer tutoring program; for example the variables could include the number of practice trials, number of successful trials, amount of feedback received, and number of interactions with fellow students experience by the tutee. Alternatively, an analysis of the effect of the program on the tutors would also serve to provide insight into the course's impact beyond that of the tutee. For example, this may involve assessment of the tutor's learning, their perspective of disability or their effectiveness as tutors. Additional cofounding variables may also be assessed to better understand the effectiveness of the OPD course; for example, a comparison of the course's effectiveness depending on the nature of the disability of the tutee.

Several methods were employed to reduce the rate of attrition, as presented previously in this chapter. Despite these efforts, 29 individuals did not complete the required 65% of the course. It should be noted that the course platform used for this study did not allow the instructor to see what sections of the course were completed; only a percentage of overall content was provided. Any analysis of the demographic information available for this group suggests that a lack of relevance of course content may be the reason; more individualized content and instructional methods may help alleviate attrition in future courses. Demographic information was only available for nine individuals in the "drop out" group due to the demographic survey being built into the course-teachers need not complete the demographic questionnaire prior to course completion. Future research should ensure that demographic variables are collected prior to the students entering the course so as a greater understanding of the characteristics of teachers who drop out can be examined. In addition, the timing of the OPD course may impact on attrition rates. Future OPD providers must consider offering sufficient time frames for course completion that allow teachers to work around busy teaching periods.

In addition it was seen that the number of control group teachers who dropped out exceeded that of the experimental group. This may be due to the fact the teachers in the control group began the course later than the teachers in the experimental group. This could have resulted in them completing the course at a busy time in their schools-for example perhaps beginning the Spring semester-or perhaps at the time of data analysis the teacher intended to return to complete the course and therefore their "drop out" status was incorrectly assigned to them. Future studies should be cognizant of the time in which the control and experimental group are completing the course and provide ample time for both groups for course completion.

Research on previous physical education PD has highlighted that informal interaction between teachers is a critical learning experience for physical educators (Armour & Yelling, 2007). Although the learning platform used for this course offered use of only a basic forum facility and teachers were not encouraged to interact with fellow teachers, interactions naturally arose. Future research should facilitate, encourage, and incentivize social interaction between teachers. In addition, analysis of forum interactions would provide insight into how forum can best be used for the benefit of the learners.

The level of learning that occurred due to participation in the OPD course and the overall teachers' high level of satisfaction with the course can be largely attributed to strict adherence to theories of learning and instruction. Both ALT and CTML provided an effective framework for the design of format and content delivery in this course. Future research on OPD courses must continue to

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underpin course designs with clear theoretical principles. Measures of validity of application of theoretical principles should also be conducted.

This research provides a foundation for future research on the effectiveness of OPD to provide physical educators with the knowledge and skills necessary to implement peer tutoring. Based on the successes and limitations of this study, future research directions can be delineated. First, a number of changes to the course should be made, including the addition of more videos, individualized podcasts for teachers at the different school levels, increased opportunity for participation to participant interaction and course assessments that are build into the online platform. Second, to ensure the fidelity of implementation is upheld, future research should examine how the teachers are implementing the course content; is their implementation adhering to evidence based practices? Direct observation of teachers, video recording or improved audio recording of teacher may be used to achieve this. This research could also be further extended and strengthened by an analysis of the impact on student learning for both the tutee and the tutor. Finally, additional teachers should also be recruited to ensure power for retention is upheld.

## Conclusion

This study demonstrated how OPD, designed and created based on CTML and ALT principles, was effective in providing physical educators with knowledge about peer tutoring. In addition, teachers' self report of application of the OPD's lessons showed that 22% (n = 8) of participants completed all the steps required for implementing a peer tutoring program. Suggestions were provided to increase application in future OPD course, including making application a requirement for teachers and offering the OPD at a timeframe that provide ample opportunity for application of activities. Participants also completed a Perception of Professional Development survey (Buschang, 2012) which revealed an overall positive perception of the online environment as a setting for PD. Both the application of CTML (e.g. the podcasts) and elements related to the application of ALT (e.g. flexibility of pacing of learning and relevance of material) were cited as being effective aspects of the OPD. Conversely, issues related to data collection, the user-friendliness of the learning platform and time required for application of course activities were noted as components of the course that were "least liked."

Issues related to attrition were also discussed, as 29 teachers failed to complete the course at the time of data analysis. Examination of the demographic data revealed that teachers with a masters in APE and high school teachers were significantly more likely to drop out. It was hypothesized that this was due to the course not being perceived as relevant to their work. This research provided evidence for the potential of OPD, grounded in evidence-based instructional strategies, to provide physical educators with the knowledge and skills necessary to better include students with disabilities. Further studies should be conducted to refine the design and delivery of OPD, with a particular focus on application of lessons learned to the physical education class.

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APPENDICES

#### APPENDIX A

#### **Content Validation; Instructions, Responses and Action Taken**

Please drag and rank (1st to 11rd) the following objectives in order of importance:

1) Learners will recognize the benefits of peer tutoring

- 2) Learners will be able to choose a peer tutor program format
- 3) Learners will know how to choose a peer tutor
- 4) Learners will know how to prepare the class for peer tutoring
- 5) Learners will be able to train tutors in their roles and rules.
- 6) Learners will be able to train tutors in appropriate communication strategies
- 7) Learners will be able to train tutors in appropriate instructional strategies
- 8) Learners will be able to train tutors in providing feedback
- 9) Learners will be able to train tutors in appropriate motivational strategies
- 10) Learners will be able to implement a safe peer tutoring program
- 11) Learners will be able to implement a successful peer tutoring program



Results

		Within section 1, how			how many minutes
	How many	many minutes should	Within section 1, how	Within section 1, how	should be spent on
	minutes	be spent on the	many minutes should be	many minutes should	the following
	would you	following objective?	spent on the following	be spent on the	objective? Learners
	suggest is	Learners will recognize	objective? Learners will	following objective?	will know how to
	spent on	the benefits of peer	be able to choose a peer	Learners will know how	prepare the class for
Expert	section 1?	tutoring.	tutor program format.	to choose a peer tutor.	peer tutoring.
1	60	25	10	10	15
2	55	15	10	10	20
3	50	10	15	10	15
4	60	15	15	15	15
Mean	56.25	16.25	12.5	11.25	16.25
SD	4.787135539	6.291528696	2.886751346	2.5	2.5

## Within section 2, how

	How many	many minutes should be	Within section 2, how many minutes	Within section 2, how many minutes
	minutes would	spent on the following	should be spent on the following	should be spent on the following
	you suggest is	objective? Learners will be	objective? Learners will be able to	objective? Learners will be able to train
	spent on	able to train tutors in their	train tutors in appropriate	tutors in appropriate instructional
	section 2?	roles and rules.	communication strategies.	strategies
1	180	60	60	60
2	60	15	20	25
3	60	20	20	20
4	120	40	40	40
Mean	105	33.75	35	36.25
SD	57.44563	20.56494	19.14854	17.96988

Time allocation: section 3

		Within section 3, how many minutes	
	How many minutes	should be spent on the following	Within section 3, how many minutes should be spent on the
	would you suggest is	objective? Learners will be able to train	following objective? Learners will be able to train tutors in
	spent on section 3?	tutors in providing feedback	appropriate motivational strategies
1	90	30	60
2	40	20	20
3	40	20	20
4	30	15	15
Mean	50	21.25	28.75
SD	27.08013	6.291529	20.96624

### Time allocation: section 4

No. Data

		Within section 4, how many minutes should be	Within section 4, how many minutes should be
	How many minutes	spent on the following objective? Learners will be	spent on the following objective? Learners will
	would you suggest is	able to support tutors to implement a safe peer	be able to support tutors to implement a
	spent on section 4?	tutoring program	successful peer tutoring program
1	120	60	60
2	40	20	20
3	90	40	50
4	30	15	15
Mean	70	33.75	36.25
SD	42.42641	20.56494	22.12653





#### PI Response/action taken:

It was decided that a higher percentage of time be allocated to section one as the PI felt it was worth dedicated additional time to presenting the benefits of peer tutoring. The PI felt this was necessary to motivate the learner to continue with the course and see its practicality and usefulness for their situation. In addition, section 2, 3 and 4 include self-report activities, which were not included in the reported 'time allocation'

	Actual time allocation
	(%)
Section 1	38
Section 2	24
Section 3	19
Section 4	18



#### **Instruction:**

6) Are there another objective/s that you think is/are necessary to fulfill the course's aim of enabling physical educators to implement peer tutoring? If so, how much of course time would you suggest is spent on this objective? Expert responses:

Behavioral management strategies (e.g., reinforcement strategies) for at least 60 minutes

Collect data and assess learning through quantitative and qualitative methods (15 minutes for this with examples)

If section 4 includes case studies or analyzes of situations when and how the PT can be implemented? As I understand, in this section teachers will implement all the knowledge they acquired from previous sections. Is it so? Then I would suggest leaving the objective of implementation of a successful peer tutoring program (that I think includes saftey issues, too). However, spend about 30 minutes on each of the school level (elementary, middle and high school). PI Response/action taken:

Behavioral management strategies were incorporated into section 3 (for example using a token economy, first then boards, countdown strips, etc). Data collection was included into section 3 "Providing feedback" and section 4, "Ensuring a successful peer tutoring program." Learners were taught how to train peers in assessing skills using a task analysis checklist. Section 4 does include implementing a safe and successful program and some examples are provided. Evaluating validity of content for each objective: Note: Violations of the apriori rule are highlighted in bold Objective: learners will recognize the benefits of peer tutoring.

Content:"We will now introduce a strategy, called peer tutoring that will help you overcome some of these challenges. In this podcast you will learn what peer tutoring is and what are the benefits of peer tutoring. Peer tutoring is a strategy that involves trained peer tutors providing assistance to students with disabilities, in a way that increases the learning and social experience for the tutee, while not negatively affecting the tutors learning. Peer tutoring has shown to benefit all involved. The following video will show you an example of a tutor and tutee in a physical education class. For the teacher, peer tutoring can provide five key benefits.• There is reduced time spent on repetitive work in the physical education class; for example, there is less need to give repeated instructions and reinforcement.• There is increased time for monitoring the entire class and responding to all students needs at both ends of the spectrum.• The teacher will experience personal gratification in seeing the rewards reaped by both tutor and tutee• The teacher will be less reliant on support such as paraprofessionals• The peer tutor program will result in increased positive effect in the entire class The peer tutors will also benefit from being involved in this program:• They will have increased self esteem and confidence. They will development a greater understanding of individuals with disabilities. They will develop a increased understanding of teacher's role• And, perhaps most importantly, they will benefit from increased academic mastery; as a result of becoming a tutor they will pay greater dedication to their own learning so as they can be effective tutors. And for the tutee. The tutee will received increased, individual instruction; having a trained peer tutor will allow for the students with a disability to receive increased instruction throughout the physical education class. Similarly, the tutee will receive increased praise, feedback and encouragement, all essential components for learning. • As the tutee will now have a tutor by his or her side the tutee will experience increased time on task and participate in less off task behavior• The presence of a peer tutor will also result in much more socialization for the tutee. We will pause now and I encourage you to think of a student in one of your classes that may benefit from a peer tutor. This student need not necessarily have a disability but they should require some assistance in physical education. We will then begin to consider a peer tutoring program format that will benefit this student. And then, we will learn about preparing the class for peer tutoring for this student. In addition, all future course activities will be completed with this student in mind. This will ensure the course is as practical as possible for you." Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree. In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer. Thank you

# Does the content in this podcast align with research on peer tutoring?

1	1	25.00%
2	0	0.00%
3	0	0.00%

4	0	0.00%
5	0	0.00%
6	0	0.00%
7	0	0.00%
8	0	0.00%
9	0	0.00%
10	3	75.00%
Total	4	
Mean	7.75	
Standard Dev.	4.50	
Variance	20.25	

## Is the content sufficient to fulfill the objective?

1	1	25.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%
6	0	0.00%
7	0	0.00%

202

8	0	0.00%
9	0	0.00%
10	3	75.00%
Total 4		
Mean	7.75	
Standard Dev.	4.50	
Variance	20.25	

203

No.	Expert feedback	Action taken

If you rating any of the above as being less than 6, please provide a rational for your scoring.

1

Additional examples added 2 Give a few examples throughout if possible throughout. 3 Since I cannot see the podcast, I'm not sure how podcasts 3 how I can rate this part? could be seen. Rule violation (rating >6)?

Yes

Objective: Learners will be able to choose a peer tutor program format.

Content: "Now that you have identified a student in one of your classes who can benefit from peer tutoring, it is time to prepare for peer tutoring. In this podcast we cover the first two steps in this process: choosing a peer tutor program format and choosing tutors. First, choosing a peer tutoring format. There are four formats:• One to one peer tutoring, with one tutor working with one tutee.• A group of students, rotating as tutors, for every class or every activity, with one tutee.• Cross age peer tutoring; this involves an older student, the tutor, working with a younger tutee. and. Classwide peer tutoring, a format in which all students take turns as tutor and tutee. In this course we will focus on guiding you through the process of implementing one to one peer tutoring and rotating peer tutoring. However, after this podcast you will see a link to information on the other peer tutoring types if you wish to learn more about them. First, the one to one peer tutoring format; one tutor provides assistance to one tutee. This format has three main benefits:1) The tutee will receive consistent instructions and feedback from the tutor.3) There is time for a bond to be developed between tutor and tutee.2) It gives the tutors a chance to develop in their role as tutors. A possible disadvantage of the one to one format is that it may result in reduced practice time for the tutor, who may become over involved in assisting their tutee. In addition, only one tutor gains the benefits of peer tutoring. You may also choose a rotating peer tutoring format. It involves a group of tutors, rotating around one tutee. It has a number of advantages.• Tutors will have increased time for their own individual practice; as they are now taking turns to act as tutors.• The tutee will socialize with more than one tutor, with a group of tutors
now interacting with him or her.• The tutee will not be without a tutor, if a tutor is absent,• A group of students, instead of just one, can now gain the benefits of being a tutor.A possible disadvantage of this format is that the tutee may not receive consistent instruction and feedback from different tutors. For some students, particular students with autism who like routine, changing tutors may be problematic.Now that you know about two types of peer tutoring, take a moment now to consider which format would best benefit the student that you have identified"Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.Thank you

#### Does the content in this podcast align with

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%
6	0	0.00%

research on peer tutoring?

7	0	0.00%
8	0	0.00%
9	0	0.00%
10	2	100.00%
Total	2	
Mean	10.00	
Standard Dev.	0.00	
Variance	0.00	

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%
6	0	0.00%
7	0	0.00%
8	0	0.00%
9	0	0.00%
10	2	100.00%
Total	2	

Mean	10.00
Standard Dev.	0.00
Variance	0.00

Rule violation (rating > 6)?	No
	110

No.	Expert Response	Action taken
	If you rating any of the above as being less than 6,	
	please provide a rational for your scoring.	
1	You are missing one important component that I	This important
	have used that is essential.	suggestion has been
		added to the scripts.
2	2-3 trained tutors and ONE teaches each class and	Teachers are told to
	they rotate each class NOT within the class. I would	ensure rotations occurs
	NOT use the one that switches in the middle of the	between classes; not
	class. There are too many issues with this one	within.
	related to responsibility of who is tutor and self	
	esteem of the tutee in question. This is NOT	
	recommended. Use the above concept for #2 sample	

Objective: Learners will know how to choose a peer tutor.

Content: The next step is choosing a peer tutor; you may try one of two approaches. Firstly, you can invite all classmates to apply, and then choose the student you feel would be most effective as a tutor. Using this method, you should be sensitive to the feelings of the students who do not get selected. They should be praised for their willingness to be involved in the project and assured that they will get a chance to be a tutor in future classes. Instead of inviting all students to apply you could also invite specific students, who you feel would make good tutors, to apply. Note; becoming a tutor should always be a position that the tutor applies or volunteers for. You should emphasize that the student should take on the position only if they really want to. It is generally the case that students are very keen to take on the position of being a peer tutor. Selecting the tutor is an important job. An effective tutor should exhibit traits such as friendliness, patience, and responsibility. They should also be cooperative and follow the instructions you provide; this will ensure that they, as tutors, model the behaviors you want. Finally, the chosen tutor's personality should align with the tutees personality. For example, a shy and reserved tutee may not feel comfortable with a tutor who is very talkative or energetic. Therefore, you should spend time deliberating on your choice of tutor. After this podcast, please take a moment to think about potential tutors in the class of the tutee that you have identified earlier in this section... what would make these students good tutors? Now that the tutee and tutor have been chosen, you can seek parental permission for the students' participation in the

program. Although this may not be required in your school, it is advised. After this podcast you will be directed to download a letter that can be sent home to the parents of the participating students, for this purpose. It outlines what is required of their child, as well as the benefits involved. Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree. In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

#### Does the content in this podcast align with

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%
6	0	0.00%
7	0	0.00%
8	1	33.33%
9	0	0.00%
10	2	66.67%
Total	3	

research on peer tutoring?

Mean

Standard Dev.	1.15
Variance	1.33

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	1	33.33%
6	0	0.00%
7	0	0.00%
8	0	0.00%
9	0	0.00%
10	2	66.67%
Total	3	
Mean	8.33	
Standard Dev.	2.89	
Variance	8.33	

Yes

No.	Expert Response	Action taken
	If you rated any of the above as being less than 6, please	
	provide a rational for your scoring.	
	Why no mentioning of gender, cultural, and language	The PI felt this was
	[e.g., with English as Second Language Learners]	beyond the scope of this
1	considerations?	PD.
2		
3		
4		

Objective: Learners will know how to prepare the class for peer tutoring.

Content: "Finally, it is time to prepare the class for the peer tutoring program. For peer tutoring to be most effective, an environment of trust and peer acceptance should be fostered in the class. Students must learn to understand, welcome and value each other, including the student with a disability. For this to occur, a peer tutoring preparation activity should occur. When planning this activity, it is important to be sensitive of the needs and wishes of the student with a disability. For older students, you should involve them in choosing and planning the preparation activity. You should also involve the parents and inform them of the peer tutoring program plan. This process can be easily done at the start of one of your physical education classes. The most effective strategy for your situation will depend on the ages, maturity levels, and social awareness of the students in the class. The following are some strategies you can consider for your class. A discussion with your class based on the premise of being a good friend to your class-mates is one simple way of fostering an environment of friendliness and helpfulness in the class; for example you may ask the students to give examples of behaviors that make them good friends to their classmates. How do these behaviors make them others feel? What behaviors would not make you a good friend to your classmate? Such discussion points will help them consider how they treat their classmates. Being a tutor is an extension of being a good friend; being kind, helpful, and caring. An advantage of this strategy is that it does not isolate the student with a disability. It is a good choice for classes of young students, or when there is a chance the student with a disability, the tutee, will feel isolated or self-conscious during activities that speak directly about having a disability.

Simulation activities involve students performing some activities while having limitations imposed reflecting having a disability; for example students may compete an obstacle course using blindfolds, wheelchairs, or mobility aids. A discussion should follow focusing on how each student felt while doing the activities and what challenges they faced. The discussion should also focus on how their peers could help them overcome these challenges. These activities aim to develop compassion and understanding amongst the class. This strategy is best implemented with mature, socially aware students. More suggestions are provided on a document you can download after this podcast.Famous people with a disability may also be the focus of a discussion, to help change the perceptions the students may have regarding disabilities. You should choose a famous person with a disability that is relevant to the students, and may inspire them to rethink their definition of disability. Discussion points in this activity should be centered on the potential of people to overcome challenges, and the importance of not judging people's ability based on them having a disability. This strategy is most effective with older students. If this is a strategy you wish to use in preparing your class for peer tutoring, after this podcast, there will be a link to a document with information on some famous people with disabilities. You may use interesting videos, showing the success of individuals with disabilities in sports, to change the student's perceptions of disability. Video sharing sites such as youtube have many great videos; for example, through just searching for the word "Paralympics," you will discover lots of great videos that you could use. Some videos are also suggested in the document you can download after this podcast. Just like for the famous people activity, discussion points in this activity should be centered on the potential of people to overcome challenges, and the errors of prejudging

individuals based on a disability. Finally, if the student or students in your class who have disabilities are comfortable in talking to the classes you may also involve the students in direct discussions on disability. As well as the students with disabilities talking about their situation, the other students can talk about a friend or family member who has a disability also. This strategy demands a high level of social awareness and maturity so consider this when choosing to use this strategy. All these strategies may be employed to help foster an atmosphere of friendliness and understanding in the PE classroom. However, strategies should be chosen, and implemented, being sensitive to the wishes and preferences of the student with the disability. Remember when you are applying this in the classroom, before taking the next section of the course, you may consider trying some of these strategies in a class that does not have a student with a disability. It will still greatly benefit the students. Take a moment now to think what strategy you may use to prepare your students for your peer tutoring program. Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

Does the content in this podcast align with

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%

research on peer tutoring?

	6	0	0.00%
	7	0	0.00%
	8	0	0.00%
	9	0	0.00%
	10	3	100.00%
-	Total	3	
-			
-	Mean	10.00	
	Standard Dev.	0.00	
	Variance	0.00	

-	1	0	0.00%
	2	0	0.00%
	3	0	0.00%
	4	0	0.00%
	5	0	0.00%
	6	0	0.00%
	7	0	0.00%
	8	0	0.00%
	9	0	0.00%

.00.00%	

Rule violation (rating > 6)?		No
No.	Expert Response	Actions taken
	If you rated any of the above as being less than 6, please	
	provide a rational for your scoring.	
1		None Required
2		
3		
4		

Objective: Learners will be able to train tutors in their roles and rules.

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Content:"Welcome to section 2 of "peer tutoring in physical education." In this section, we will begin to learn about training the peer tutor. Research has shown appropriate training of tutors is key to an effective peer tutor program. This is why training is the focus of this section. Training does not require too much time, from fifteen to thirty minutes, and can occur prior to, or after, a physical education class and can be spread across a number of classes. Please use your own experience and knowledge of your specific situation to plan the best training program as possible. We will give suggestions of how you can do this throughout the course. This section includes the first four steps of training the tutors: Ø Roles of the peer tutorØ Rules for the peer tutorØ Communication strategies andØ instructional Strategies In the first podcast we will cover the first topic: the roles of peer tutoring. It is recommended that tutors have three roles. First, they have a role to communicate with the tutee: remember, one of the main benefits of peer tutoring is increased socialization for the tutee. Second, they should instruct and give feedback to the tutee to increase learning. And finally they should motivate the tutee, to help keep them on task. These are the C.I.M. roles of the tutor. It is important, in the first step of training, that you inform the tutors of these roles so as they know what they are volunteering for. To help you do this you should use age-appropriate terms. For example you may tell the tutors that their roles are to be friends with the tutee, be a teacher's helper and be a cheerleader for the tutee! Take a moment now to consider the roles of your tutor?"Second podcasts contents:"Now that the you know what roles your tutors will fulfill. There are also some rules of being a tutor that should be taught in the first training. Rules will depend on your circumstances, the grade level of the students

involved and perhaps the characteristics of the students. But some rules that apply to all tutors may be: Be positive: tutors should be kind and respectful towards the tutors and not criticize them. Tutors should respect the privacy of the tutee and not discuss what they say with other students. Tutors should ask the tutees permission before physical prompting them. And finally, tutors should always ask the teacher for help when they are not sure about something. This final rule is very important. It would help to have a system set up that allows the tutor to signal to you that they require help. For example, they will put their hand up. Especially at the beginning of the peer tutoring program, it is expected that some issues will arise that the tutor will not know how to deal with. For example, what to do when the tutee refuses to participate or when the tutee is not being successful learning a skill. Such situations demand the teachers expertise and the tutor must have a means to request this. These are just examples of rules. But remember, these rules should be dependent on your specific situation. For example, if the tutee uses a motorized wheelchair a rule might be, not to touch the controls. Or if the tutee has autism and has tactile sensory issues, the rule may be "do not physically prompt the tutee." Take a moment now to write down some rules you might teach your tutors"Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree. In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

# Does the content in this podcast align

with research on peer tutoring?

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%
6	0	0.00%
7	1	33.33%
8	0	0.00%
9	0	0.00%
10	2	66.67%
Total	3	
Mean	9.00	
Standard Dev.	1.73	
Variance	3.00	

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%

5	0	0.00%
6	0	0.00%
7	1	33.33%
8	0	0.00%
9	0	0.00%
10	2	66.67%
Total	3	

Mean	9.00	
Standard Dev.	1.73	
Variance	3.00	

Rule	violation (rating > 6)?	No
	Expert Feedback	Action taken
1		
	I would add assessment and documentation of	This is covered in a later
	learning to the roles. This can be a checklist, task	section
	analysis, frequency counts, rubrics, or formal	
2	assessments. And give examples	
3		
4		

Objective: Learners will be able to train tutors in appropriate communication strategies

Content: "Effective communication between tutor and tutee is essential. In this podcast you will learn about training the tutor to use appropriate communication skills. Prior to completing the next section you can train your tutor in the use of these skills. This aspect of the training should be specifically designed around the tutee. Some communication issues to think about include:Initiation of conversation and interaction. All tutors should be reminded of the importance of basic interaction behaviors that are important for the tutee to feel comfortable and respected. These behaviors include greeting the tutee at the start of class, smiling to the tutee, and asking questions to the tutee. Although these seem like common practice, they should still be part of the training. Use role playing to allow the tutor to practice these behaviors. You may train the tutor to follow a script for this. The following is an example of a script you could train them in. It should be adjusted to match their age level. After this podcast you can download this script, edit it if necessary, and use it in your training.(script in text: Hi

How are you today? Are you ready to have fun in PE?I will work with you today) In addition, when training the tutor in communication skills, we must focus on specific forms of communication that the tutees use: Many students, particularly students with autism and intellectual disabilities, really benefit from pictures used as prompts. If your tutee benefits from pictures, then train your tutor to use these when they work together. For example a picture can be used for the tutor to signal to the tutee that PE will be done outside today. With the increase in the use of tablets, many

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students are using these to facilitate communication. Again, if your tutee uses a tablet to communicate, then train the tutor so that they can communicate using the tablet also. For example, the tutee may use a tablet to communicate that they need to use the restroom or need a water break or simply to ask questions such as "how are you?" and the tutor should be able to respond appropriately. If your tutor has a hearing impairment, then training you tutors in the use of some basic sign language may be helpful. For example signs for "do it like this" or "start" and "finish" would be helpful. The tutor should also be trained to read some signs such as "show me again" and "I need a break." Many students have difficult processing verbal communication. It would be very beneficial for many tutees if the tutors were trained to use modified verbal communication. For example for some students may benefit from receiving just one concrete instruction at a time, which mat be just one word or two. If you think your tutor would benefit from communication like this then consider including it in your training. In addition to teaching specific communication strategies, you may have to also train or prepare your tutor if the tutee has some abnormal verbal language use. For example, if the tutee has autism and is echolalic, meaning they have a tendency to repeat what another person says, or if they like to talk excessively about specific interests, then the tutor should be prepared for this. Preparation may involve just making the tutor aware of these behaviors, or perhaps teaching them to use a redirection phrase, such as "we will work now." Some students, particularly those with autism, may also exhibit some abnormal body language. From example they may shake their hands when stressed or excited. Or they refrain from making eye contact. The tutor should be prepared from these behaviors prior to the implementation of the peer

tutoring program.Take a moment now to consider the communication strategies that you should train your tutors in so as they can effectively work with the tutee you have identified at the beginning of section 1"Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

Does the content in this podcast align with

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	1	33.33%
6	0	0.00%
7	0	0.00%
8	0	0.00%
9	0	0.00%
10	2	66.67%
Total	3	

research on peer tutoring?

Mean

Standard Dev.	2.89
Variance	8.33

1	0	0.00%
2	0	0.00%
3	0	0.00%
4	0	0.00%
5	0	0.00%
6	0	0.00%
7	0	0.00%
8	1	33.33%
9	1	33.33%
10	1	33.33%
Total	3	
Mean	9.00	
Standard Dev.	1.00	
Variance	1.00	

Rule violation (rating > 6)?		Yes
	Expert Feedback	Action taken
		The PI felt this was beyond
1	What about English Language Learners?	the scope of this PD
	Do NOT use the term hearing impaired. Use Deaf	Term changed
2	OR Hard of Hearing	
3		
4		

Objective: Learners will be able to train tutors in appropriate instructional strategies.

Content: "So far you have learned how to train the tutors in the roles and rules of peer tutoring and how to communicate with the tutee. In this podcast you will learn how to train the tutor to instruct the tutee. Remember one of the main benefits of peer tutoring is that the learning for the tutee increases. This is due to the increased, individualized instruction they will now receive from the tutor. However, the tutor must be taught to instruct effectively. This is an important step in the training of the peer tutor. It is beneficial to teach the tutors a framework that they can follow. An instructional framework will help them to remember to instruct in a way that most facilitates learning for the tutee. The instructional framework you choose to teach them will depend on the characteristics of the tutee. For example, their age, ability to concentrate and learning preferences. The following is an example of a framework you may use or adapt for your tutors. First tell the tutee what skill they will be working on. Then tell them how they will do it. Then show them what part of the skill they will be practicing. Then, when necessary, the tutor provides help to the tutee to do it correctly. The final step in this framework is providing feedback. We will cover this in the next section of the course. The following script will show how this framework is used to teach a skill. After this podcast you can download this script, edit it based on the tutee and the skill you are focusing on in class, and then give it to the tutor to practice with and use when working with tutee.(script)You will notice in this script that only one specific part of the skill is working on at one time. This is the whole-part-whole method of teaching. This involves the tutor first demonstrating the whole skill, then instructing the tutee on each individual "part" of this skill. Then, when ready, the parts are combined so as the tutee practices the whole skill. For many students, this is the best way to teach a skill. This framework could be taught to many peer tutors to use effectively. However for some tutors another framework would be better. For example for younger tutors a simple framework of tell how and show how, might be enough. For older tutors, we may train them to use some more sophisticated instructional strategies. Perhaps these strategies are ones you knew would work with the student, but due to some constraints, such as lack of time or a large class size, you were never previously able to implement. Well

now that you have a peer tutor you may be able to use some of these evidence-based strategies.We spoke about using visuals for communication previously. If these are a communicative tool that the tutee would benefit from, then you should also train them to use visuals to help instruct the tutee. For example, prior to the beginning of class you could print out a visual depicting some skill that you will focus on in class. The tutor could use this visual when instructing their tutee. With some of the older tutors, video modeling may be a viable instructional strategy for them to use with their tutors. It involves using a video model to demonstrate a skill or action. It has been shown to be very effective for teaching students with autism in particular but could potentially be used for all tutees. Again, prior to class you could download a video model of the skill you are going to teach and have your tutor use the video playing device, for example a tablet or even a smart phone, to instruct the tutee using the video model. After this podcast you will see a link to a document in which you can read more information about using video modeling. For some students physical prompts are beneficial for learning new skills. This may be a strategy that you can teach your tutors to use. It simply involves using physical guidance to encourage the tutee to move in the correct pattern. The physical prompt should be a least intrusive as possible. For example perhaps a tap on the elbow is enough to prompt the tutee to raise his arm. If your tutee could benefit from physical prompts then it is a instructional strategy you should train your tutors to use. Remember that the tutor should always ask for permission before physically prompting the tutor and clear guidelines should be given to where the tutor can touch. For example, physical prompts are only allowed on the arms and below the knees. In this podcast we have reviewed how you can your tutors in instructional strategies. We

first suggested you use a framework of instruction, and then, with older tutors, you train them in the use of more complex instructional strategies such as using visuals, video modeling, modified verbal instruction and whole-part-whole instruction.Take a moment now to write what instructional framework you will train your tutors in." Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

#### Does the content in this podcast align with

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10	2	66.67%
Total	3	

research on peer tutoring?

Mean

Standard Dev.	1.15
Variance	1.33

230

# Is the content sufficient to fulfill the

### objective?

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10	2	66.67%
Total	3	
Mean	9.33	
Standard Dev.	1.15	
Variance	1.33	

Rule violation (rating > 6)?

No

Expert	response
--------	----------

#### Action taken

1		
	Again here-how do you measure success? Include	This is covered in a later
	various ways to determine successful performance.	section
	Should they just go through the motion OR should	
	they achieve? How do you measure success? How	
	do you know your program is working? THIS IS	
2	CRITICAL!!	
3		
4		

Objective: Learners will be able to train tutors in providing feedback.

Content script:"Welcome to section 3 of peer tutoring in physical education: a practical solution for inclusion. In the previous section you learned about training the tutors in their roles and rules. You also learned about training them in the use of communication and instructional strategies. Now you have applied these training steps with your

tutors, it is time to learn about the final steps of the training process. Your tutors will then be ready to work with their tutees and all can gain the benefits of the program.In this section we cover training part 2. This includes training tutors in the use of feedback and training the tutors to be effective motivators for the tutees. Finally we discuss how you may allow the tutors to practice their newly learned skills. In this podcast we will focus on the first of these topics: training the tutor to give feedback. As an experienced physical educator, you know the importance of feedback for your student's learning. However, with large class sizes we cannot always give the amount of individualised feedback we would like. The tutors ability to provide this individualized, timely feedback to the tutee is a great benefit of peer tutoring and will result in increased learning for the tutor. However, it is important that this feedback is effective. This is why it is such an important part of the training process. You should train your tutors to provide two kinds of feedback: general and specific. General feedback is just that, general, it is the tutors reaction to the overall behavior of the tutee. Phrases such as "great throw" or "good work" are examples of this feedback. Tutors will often provide this feedback naturally, but nonetheless it should be included in the training. (video to demonstrate inserted here) The second type of feedback that the tutors must be trained to provide is specific feedback. This feedback is most useful for learning. Specific feedback describes a specific aspect of the movement. For example, specific feedback may be "good stepping with your foot" or "great follow through," or "next time, use your fingertips." The tutor should also use the name of the tutee when providing this feedback.(video to demonstrate inserted here)We will later discuss how you can use practice scenarios to allow your students to practice giving both types of

feedback"Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.Thank you

#### Does the content in this podcast align with

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Total	3	
Mean	10.00	
Standard Dev.	0.00	
Variance	0.00	

research on peer tutoring?

#### Is the content sufficient to fulfill the

objective?

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9	1	33.33%
10	2	66.67%
Total	3	
Mean	9.67	
Standard Dev.	0.58	
Variance	0.33	

Rule violation (rating > 6)?

No

Expert response

Action taken

	Ensure that the tutor is given a task analysis	Task analysis checklists
	checklist or some sort of clear understanding of	are discussed in the next
	the skill being taught so they give the correct	section
	feedback. The feedback is only effective if it is	
3	correct.	
4		

2

Objective: Learners will be able to train tutors in appropriate motivational strategies

Content script: "In this podcast you will learn about training the tutor to motivate the tutee. This is a very important role of the tutor. Like all aspects of peer tutoring training, the choice of motivational strategies will largely depend on the characteristics of the tutee and the age of both students. First, assessment cards can be a great motivational tool, as well as an aid to guiding instruction and feedback. Assessment is an essential component of effective teaching. Prior to class, create a card with a list of the components of the skill you will teach. Prior to practice, give this card to the tutor who can then use it to assess the tutee prior to, during and after practice. This will allow the tutee, the tutor and you to determine if learning is taking place. After this podcast you will be able to download examples of assessment cards your tutor can use.(video to demonstrate) It is also important that the tutors are positive and excited! This should be reflected in their voices: their language should be encouraging and enthusiastic. Also, positive body language is very important. A simple action such

as a high five can have a great motivating effect on the tutee. (video to demonstrate) A reward system or token economy can also be used. For example the tutor could use a penny board, whereby the tutee completes a task a number of times, achieving a reward when it is complete. The reward could be something physical, such as stickers, or a few minutes participation in an enjoyable activity. A simpler reward system may be the tutor stands up five cones. Each time the tutee completes the action, he or she can knock down one of the cones. After knocking all the cones down the tutee can then do a desired activity for a minute.(video to demonstrate) Training the tutor to motivate the tutee is the final topic of peer tutoring training. Think about the motivational strategies you might teach to your tutors." Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

#### Does the content in this podcast align

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with research on peer tutoring?

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Variance	0.00	

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Total	3	
Mean	9.67	
Standard Dev.	0.58	
Variance	0.33	

Rule violation (rating > 6)?

No

	Expert Response	Action taken
1		
		This has now been
	What should the tutor do if the tutee refuses to	included; the tutor is
	participate or exhibits extreme inappropriate	directed to seek teacher
2	behaviors?	assistance.
	The instructor can also use rubrics for the whole	The PI felt an example of
	class that would also be motivating for the tutee. OR	one task analysis checklist
	a specific rubric just for the tutee to work on. Either	was sufficient.
	way checklists, rating scales, and rubrics are great	
3	for motivation. You may want to include examples of	

To reinforce the above lessons, teachers will be encouraged to use "scenario training" with their tutors. The following is the script for the podcast.

Objective: Teachers will be able to use scenarios to train their the peer tutors

.Content script: "In section two of this course, you learned about training the tutors in roles and rules and communication and instructional strategies. You will have implemented these training steps with the tutors. In this section, so far, we covered training the tutors to provide feedback and motivation to the tutees. It is now time for the tutors to practice these skills. They will then be ready to tutor. To practice the lessons learned so far it is often best to create realistic scenarios and get the tutors to respond. It is best to do this with the tutees present. However, if you opt to practice these without the tutee present, you or another student can act out the role of the tutee. You can then provide feedback to the tutors to correct their techniques. The scenarios chosen should be individualized to the tutor and tutee. Choose scenarios that are likely to arise in a typical physical education class. The following scenarios are examples that could be used; note, that these scenarios should be realistic and offer opportunities for the tutors to practice the skills learnt. To practice communication strategies a scenario may be; "You are the tutor for Alice in your class; when you enter the class you see she is sitting alone; how would you make her feel welcome and comfortable in the class?" (Video to demonstrate inserted here) To practice instructional strategies, you may present a

scenario such as this on screen (wait 7 seconds). Allow the tutor to act out how they would assist the tutee using the instructional framework you taught them. This should also involve practice of instructional strategies such as whole-part-whole teaching, using visuals or physical prompts. Offer feedback to the tutor until they perfect the technique. You should also use scenarios to enable the tutor to practice providing feedback, the tutee, or someone acting the role of the tutee, performs a skill and the tutor provides general and specific feedback. The tutor should also practice assessing the tutee; for example you should present the tutor with as assessment card for a skill, and then ask them to assess the tutee as they perform this skill. Other motivational strategies such as using a reward system should also be practiced using scenarios. Again, it is important that you provide feedback to the tutor until they perfect the techniques. All scenarios used in this training should replicate actual situations that tutors will find themselves in. Take a moment now to create scenarios you will use to train your tutors, before you being to implement the program." Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree. In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

Does the content in this podcast align with

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research on peer tutoring?

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Total	3	
Mean	10.00	
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Standard Dev.	2.31	
Variance	5.33	

Yes

Rule violation (rating > 6)?

Expert FeedbackAction taken12Vuse the term "upcoming units of instruction." WhenThis is now insertedyou say "situations that will likely arise." This is notspecific enough. If you say "upcoming units ofinstruction such as soccer, volleyball or yoga," theywill choose something that is really going to betaught during the implementation of the peer tutor

3 program. You may also give examples of something

242

that may likely happen such as a seizure, defiance (sitting down and not participating), redirection during instruction, or the need to use sign language.

4

Objective: Learners will be able to support tutors to implement a safe peer tutoring program.

Content: "The next role you have as the physical educator implementing this peer tutoring program, is to ensure success for the students involved. You have already taken the most important step towards this by training the tutors. But now you have a role to evaluate the program. This will allow you to determine whether changes need to be made or additional tutor training is needed? You should assess for three things. Increased learning, increased social interaction, and increased on-task behaviorIncreased learning is a proven benefit of peer tutoring. This is the ultimate purpose of the program. But increased learning should not be taken for granted and should be evaluated for. For example, you, or the tutor, can assess the tutee using a simple assessment card that lists the components of the skill [picture]. By doing this prior to, during, and after teaching and practice, you will have an understanding of the effectiveness of the peer tutoring program. It may also suggest that some changes must take place; perhaps the tutor is not giving good demonstrations or not providing feedback. You can then retrain the tutor in these skills. Examples of assessment

cards are available for download after this podcast. Second, you should observe for increased socialization. This is another very important benefit of peer tutoring. You should look for reciprocal interaction between tutor and tutee. Also, in free time phases of the class, be aware for instances for where the tutor is isolating the tutee by discouraging interaction with other class mates. Finally you should observe for increased time on task. As a result of the tutor providing increased individualized instruction, feedback and motivation, the tutee should be spending increased time on task, meaning the tutor is focused on the task at hand. If the tutee is not staying on task, return to training the tutor in motivational strategies and feedback strategies. Consider using a reinforcement strategy, such as a penny board, a token economy or another reward system." Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

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research on peer tutoring?

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Total	3	
Mean	10.00	
Standard Dev.	0.00	
Variance	0.00	

## Is the content sufficient to fulfill the

## objective?

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Rule violation (rating > 6)?

Yes

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Mean	8.67	
Standard Dev.	2.31	
Variance	5.33	
		<u> </u>

2		
		The PI decided to keep the
		task analysis cards as
		simple as possible;
		therefore it was decided
		that assessment cards
		would include a
		dichotomous response
	Assessment cards should include the variables you	option only; i.e.
	want to evaluate on a likert scale. See example in	correct/incorrect for each
3	Strategies for Inclusion 2nd edition.	of a skills components.
4		

1

Objective: Learners will be able to support tutors to implement a successful peer tutoring program.

Content script:"Although peer tutoring has repeatedly proven to work well in including students with disabilities in physical education, you can expect to meet certain challenges along the way; particularly at the start. In this podcast, we will try and anticipate some of these challenges and offer solutions as to how to deal with them when they do arise. In addition, through your participation in this class you have access to a forum. When you have challenges in implementing your peer tutoring program I advise you to share them on the forum available to the right hand panel. You will see a specific discussion topic has been created for this purpose. Other teachers and the instructors of this course, can then provide suggestions as to how these challenges can best be overcome. But first, let's see what challenges may arise. Providing instructions and feedback effectively to tutors is key to a successful peer tutoring program. However, the tutor may forget some of the components of training. How can we deal with this challenge? First, we can retrain tutors: retraining sessions need not last for very long but should remind the tutors of the most important aspects of effective peer tutoring. This retraining, could be incorporated into the time you give the tutors to ask questions or provide feedback. Second, you should remind the tutees to refer to the sheet that guides them through the instructional framework created in section two. This "cheat sheet" could also summarize effective feedback and motivational strategies. The tutors can refer to this while working if necessary. Finally, perhaps the instructional framework you trained the tutor to use is too complex? Try reducing the number of steps. For example, perhaps the tutor's role is only to motivate and encourage the tutee to practice and then provide feedback to them. Another challenge that may arise is that the tutee becomes self-conscious about having a tutor. One possible way to overcome this is to use a group of tutors who rotate around the tutee. Since working with a partner is common in physical education anyway, this format may be more natural. As mentioned in the section one, it is best that tutors rotate for each class and not within classes. This prevents disruption and confusion and increases consistency in each class. You could also employ a strategy of reciprocal peer tutoring. With this format, instead of one student being the tutor, and one being the tutee, both students take turns being the tutor and tutee. This way, the student who needs the

assistance will continue to get it, while also having the chance to instruct and give feedback to another student. This will help to make them feel less isolated or different. For this strategy to occur both students should receive training in being tutors.Finally, you could overcome this challenge by only using the peer tutor for certain activities. For example, the tutor only works with the tutee while they learn a new skill for the first time. The key here is to be flexible in implementing the peer tutoring program so it best suits you and your students needs.One common criticism of peer tutoring is that it could lead to reduced practice time for the tutor, due to the time they spend with their tutee. To overcome this, try implementing a group of tutors rotating around the tutee. Again, remember this rotation should occur between classes; not within classes. This means that each student will spend less time in the role of the tutor." Please respond to this content using the scale below: 1 reflecting strongly disagree, 10 reflecting strongly agree.In addition, if you rate either scale to be less than 6, please respond to opened question to provide a rationale for your answer.

Does the content in this podcast align with

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research on peer tutoring?

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Mean	10.00	
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Tota	1	3		
Mea	n	9.33		
Stan	dard Dev.	1.15		
Varia	ance	1.33		
	Expert response			Action taken
1				
	Again as noted ear	lier consider v	vhat if the child	Done
2	exhibits extreme inappropriate behaviors?			
		appropriate b	oehaviors?	
	One other method			A suggestion was made for
	One other method for the tutor for the	for feedback a	nd preparation is	A suggestion was made for a feedback session (2/3
		for feedback a e day and the t	and preparation is tutee to come to	
	for the tutor for the	for feedback a e day and the t early. This wa	and preparation is tutee to come to as the instructor	a feedback session (2/3
	for the tutor for the class 5-10 minutes	for feedback a e day and the t early. This wa happening, e	and preparation is tutee to come to as the instructor quipment needs,	a feedback session (2/3 minutes) after classes. The

3 few minutes for feedback.

socialization. If possible OR stay after class for a

to class ten minutes early.

#### **Podcast: Teachers prompted to identify a tutee.**



#### Podcast 2: Definition and Benefits



## APPENDIX C

#### Podcast: Teachers prompted to choose an individual strategy

podcast 6: preparing the class for peer tutoring Back Next

#### Podcast 6: preparing the class for peer tutoring



## APPENDIX D

## Podcast: Teachers asked to record the interactions in class.

Podcast 7: Reporting on course applications	Back Next	Index of pages

#### Podcast 7: Reporting your application of the course's lessons



## APPENDIX E

# Podcast: learners were prompted to reflect on challenges they experience in physical education



## APPENDIX F

#### Podcast: Teachers identified a student that presents a challenge to include in

physical education; a student who may benefit from peer tutoring

## Identifing a tutee

Note: Remember to click the SUBMIT button before going to the next lecture.

\* Required

Your full name \*

Describe a student in one of your classes who may benefit from peer tutoring (include details such as age, disability and challenges experienced in teaching this student)

Submit

## APPENDIX G

#### Podcast: Text is kept to a minimum; only necessary information is presented to

#### the learner





## Podcast 2: Definition and Benefits

## APPENDIX H

Podcast: text is only used to highlight key information



## APPENDIX I

## **Podcast: overview of the sections' contents**

Podcast 3: course overview Back Next

Index of pages

#### Podcast 3: Course overview



Index of pages

## APPENDIX J

#### Podcast: statement of "in this podcast you will learn"

podcast 3: choosing a peer tutoring format Back Next

## Podcast 4: choosing a peer tutoring format



## APPENDIX K

## Podcast: text is presented on, or directly over or under the picture

Second Se

Index of pages

#### Podcast 3: Course overview



#### APPENDIX L

#### **Evaluating the Podcasts Adherence to Mayer's principles**

Adherence to Mayer's Principle of Multimedia Design

Note: Prior to providing feedback the reviewers watched a training video on how to apply Mayer's principles to podcasts similar to those used in the project. Examples of correct application were provided. Reviewers then watched three randomly selected videos and expressed their agreement to the statement "Mayer's principles are effectively applied to this podcast?" using a rating scale 1 to 10 (1 = strongly disagree, 10 = strongly agree).

Response

Instructions	Expert Feedback	required?
	Rating: 7, 10	
1. Please watch the video using the	Mean: 8.5	
following link:	<i>SD</i> : 2.1	
http://youtu.be/C1FetDaB4i4 and use	Variance: 4.5	
the scale below to evaluate it for	If you rated this podcast under 6, please provide a rationale:	No voce or co
adherence to Mayer's principles.		No response
	Reviewer feedback:	required
Mayer's principles are effectively applied	"Great adherence, I would assume this is probably one of your longer	
to this podcast?	podcasts; the breaks were nice to break-up the content. I rated it a 9,	
	mostly because of proximity of text to the picture. I felt I was scanning	
	a lot and according to Mayer is should be close. I don't think it is a deal	

2) Please watch the video using the	Rating: 9 10		
following	<i>M</i> = 9.5		
link: https://www.youtube.com/	<i>SD</i> = 2.12		
watch?v=dSl6fR8lEvU and use the scale	Variance = 4.5	No response	
below to evaluate it for adherence to	If you rated this podcast under 6, please provide a rationale:	required	
Mayer's principles.		requireu	
Mayer's principles are effectively applied	Reviewer feedback:		
to this podcast?	"Nice job again, I thought one slide had a lot of text (instructional), but		
	all was helpful."		
2) Places wetch the scides weight the	$\mathbf{D}$	N	
3) Please watch the video using the	Rating: 10 10	No response	
following	M = 10	required	

link: https://www.youtube.com/	If you rated this podcast under 6, please provide a rationale:
watch?v=qiQ-AMYXBA0 and use the	
scale below to evaluate it for adherence	Reviewer feedback:
to Mayer's principles.	"Nice job"
Mayer's principles are effectively applied	
to this podcast?	

#### **APPENDIX M**

#### **Content Knowledge Assessment Item**

How would you define peer tutoring?
Answer key: Correct answers will refer to trained tutors, providing assistance to tutees. (5 points)

The following questions are based upon this scenario: John is a fifth grade boy with cerebral palsy. He enjoys PE but recently has begun to fall behind his peers on the skills they are learning this year. As a result he is less happy in PE and requests to sit out for many activities. Mr. Bartley, his PE teacher, sometimes gives in to these requests due to "just not having the time to give John the individualized instruction and feedback he requires to be successful." Saddened by seeing John missing out on the physical and social benefits of PE, he decides to implement a peer tutoring program. After preparing the class for the program and training Sarah, (for five minutes after three successive classes), Sarah now works with John as his peer tutor.

List the possible benefits of peer tutoring for John, the tutee?
Answer key:

- Increased individual instruction
- Increased time on task
- Increased socialization

## • Increased praise, feedback or encouragement

## (3x2 points)

4. List the possible benefits of peer tutoring for the Sarah, the tutor?

## Answer key:

- Increased academic mastery (greater dedication to their own learning so as they can be effective tutors) (2)
- Increased self esteem or confidence (1)
- Development of an understanding for individuals with disabilities (1)
- Increased understanding of teacher's role (1)

## (3 x 2 points)

5. List the benefits of peer tutoring for the teacher, Mr. Bartley?

## Answer key:

- Reduced time spent on repetitive work, for example giving repeated instructions to some students (2)
- Increased time for monitoring entire class and responding to all students needs at both ends of the spectrum. (2)
- Personal gratification in seeing the rewards reaped by both tutor and tutee (.5)
- Increased positive effect in class (.5)

(3 x 2 points)

- 6. Which of the following is true regarding peer tutors? Prior to being selected as a tutor; it is important that:
  - The tutor is aware that they will gain credit for their participation as a tutor
  - The potential tutors have chosen tutees
  - The tutee has selected the tutor
  - The tutor volunteers for the position

Answer: D (5)

7. List the five important steps that must be done when beginning a peer tutoring program?

#### **Answer Key:**

Choose a peer tutor program

- Choose a peer tutor
- Obtain permission from parents of involved students
- Prepare the class for peer tutoring (develop

understanding/friendliness)

• Training the tutors

## (5 x 1 point)

8. List four activities Mr. Bartley could have employed prior to beginning the peer tutoring program to prepare the class for the peer tutoring program?

#### 9. Answer key:

- Disability awareness discussion
- Role playing/simulation activities
- Watch inspirational videos showing individuals with disabilities
- "Being a good classmate" discussion
- "Famous people with disabilities" discussion

## (4x1 points)

10. Mr. Bartley considered using a group of tutors, who would rotate and work with John. What are four possible advantages of this format?

#### Answer key:

- Tutors will have increased time for their own individual practice
- The tutee will socialize with more than one tutor
- The tutee will not be without a tutor, if a tutor is absent
- More students can gain the benefits of being a tutor

(4x1 points)

11. Suggest two possible disadvantages of rotating a group of tutors instead of just Sarah being the tutee?

## Answer key:

- There may be a lack of consistency between tutors instruction.
- Some tutees may not handle changing tutors well.

## (2x2 points)

12.

13. Mr. Bartley decided to use just one tutor, Sarah. What are four advantages of using a peer tutoring program format that involves one tutor working with one tutee?

## Answer key:

- Consistent feedback
- Consistent instructions
- Tutor can develop in his/her role
- There is time for the tutor-tutee relationship to develop

## (4x1 points)

14. Suggest two possible disadvantages of Mr. Bartley employing a one-to-

one peer tutoring format?

## Answer key:

- Tutor's own learning may be effected if his/her individual practice time decreases
- Only one student gains the benefits of being a tutor
- If the Sarah is absent, John would be without a tutor

## (2x2 points)

- 15. In Mr. Bartley's peer tutoring program which of the following may be critical for a successful program? (select all that apply)
  - Skilled tutors

- Continued support for the tutor
- Tutor training
- Whole-class peer tutoring

Answer: B and C

(5 points)

16. Mr. Bartley's training sessions with Sarah, were key to the success of the

program. List the important components of this peer tutor training?

#### **Answer Key:**

- Roles of the tutor
- Rules for the tutor
- Training in communication strategies
- Training in instructional and feedback strategies
- Training in motivational strategies

## (5x1 points)

17. Give an example of two roles that Mr. Bartley may train Sarah to fulfill as

John's tutor:

## Answer key:

## **Roles may include:**

- Communicate/socialize with John
- Instruct John
- Provide feedback to John
- Motivate John

18. Give an example of a rule that Mr. Bartley may set for Sarah, John's peer tutor.

Answer key:

Correct rules will relate to ensuring the peer tutoring program occurs in a safe and respectful manner.

- As John's peer tutor, it is important that Sarah... (click all the apply)
- Motivate John
- Instructs John
- Provides feedback to John
- Socializes with John

(3 points)

19. Provide an example of an instructional framework that Mr. Bartley, may train Sarah to follow when working with John.

Answer key:

The instructional framework may include "verbal instruction, visuals, demonstration, providing feedback, and specific instructional strategies." (5 points)

20. Now that Sarah is John's tutor, she should provide him with general and specific feedback; give two examples of general feedback and two example and specific feedback

**Answer Key:** 

- General: broad feedback such as great job, good work...
- Specific feedback identifies a particular aspect of the behavior/skills: e.g. good stepping with your foot, Great T before before you throw

(2x2.5 points)

- 21. Prior to training Sarah in instructional strategies, how should Mr. Bartley determine what instructional strategies to teach her to use with John?
  - Allow the tutor to choose from a range of strategies
  - Physical prompts
  - Strategies that have previously worked with the John
  - Visual instructional Strategies

## Answer: C

(5 points)

22. What are four indicators of a successful peer tutoring program that Mr.

Bartley should look out for?

#### Answer key:

- Increased tutee learning
- Increased tutee social interaction
- Increased on-task behavior
- Increased, or no change, in the tutors learning

(4x1)

23. As John's peer tutor, it is important that Sarah... (click all the apply)

- Motivate John
- Instructs John
- Provides feedback to John
- Socializes with John

## **Answer: All**

(5 points)

- 24. After a PE class John informs Mr. Bartley that he feels self-conscious about having a peer tutor. What are three steps that Mr. Bartley can take to rectify this?
- 25. Rotate the tutors
- 26. Use reciprocal peer tutoring
- 27. Use tutoring for select activities only
- 28. Use full class/all peer work
- 29. Use full class peer tutoring work/get other pairs working together

## (3x1 points)

**30.** During a PE class Mr. Bartley notices that Sarah is not implementing the instructional strategies learned in training. What are three steps that Mr. Bartley can take to rectify this?

## 31. Answer key:

• Retrain the tutors/further practice/demonstrate correct practice

- Make a cheat sheet or a written plan
- Simplify the instructional framework

## APPENDIX N

## Conte

Survey Text	Expert Response	Actions taken	nt
Thank you kindly for your help in validating the content of the online			Knowl
course 'Peer Tutoring in Physical Education'. One of the ways the			edge
student's learning will be assessed is through a pre and post content			Test
knowledge test. I would be very grateful if you could take the time to			Valida
			tion
complete the following short survey to assess the validity of the			
---	--		
content knowledge test questions.			
You will see how each of the course's objectives are reflected in			
questions in the content knowledge test. You are asked to rate how			
effective the questions are in assessing each objective.			
In addition, if you have suggestions as to how the question can be			
improved, please respond to the open question (this is particularly			
important if you rate the questions as being less than 6).			
Your expertise and help is greatly appreciated.			

Thank you kindly,	
Sean	
"Note: to encourage higher order thinking, some of the following	
questions are based on this scenario:	
John is a fifth grade boy with cerebral palsy. He enjoys PE but recently	
has begun to fall behind his peers on the skills they are learning this	
year. As a result, he is less happy in PE and requests to sit out for	
many activities. Mr. Bartley, his PE teacher, sometimes gives in to	
these requests due to ""just not having the time to give John the	
individualized instruction and feedback he requires to be successful."	
Saddened by seeing John missing out on the physical and social	

benefits of PE, he decides to implement a peer tutoring program. After	
preparing the class for the program and training Sarah, (for five	
minutes after three successive classes), Sarah now works with John as	
his peer tutor.	

Objective 1: $\cdot$ PE teachers will understand what peer tutoring is and
recognize the benefits that peer tutoring has for all involved. (Lecture
5)
The following questions will assess the students' learning for this
objective:
Q.1. How would you define peer tutoring?
Answer key: Correct answers will refer to trained tutors, providing
assistance to tutees.
Q.2. List the possible benefits of peer tutoring for John, the tutee?
Answer key:
—Increased individual instruction
Increased praise, feedback and encouragement
>— Increased time on task —
Increased socialization
Q.3. List the possible benefits of peer tutoring for Sarah, the tutor?

"Ple	ease r	espond	l to the	following
stat	emen	it:		
The	abov	e ques	tions a	re effective in
asse	essing	g the st	udents	' learning for
obje	ective	2? "		
9	10	10	10	10
Vio	lation	s? No		
Mea	an: 9.8	30		
SD:	.45			
Var	iance	: .20		

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>Objective 2: PE teachers will be able to choose a peer tutor format.	"Please respond to the following	The suggestion
(Lecture 11)	statement:	that the tutee
	The above questions are effective in	would feel
The following questions will assess the students' learning for this	assessing the students' learning for	isolated with in
objective:	objective 2? "	the company of
	10 7 7 9 10	a group of
Q.5: Mr. Bartley decided to use just one tutor, Sarah. What are four		tutors, was
advantages of using a peer tutoring program format that involves one	Mean: 8.60 SD:	removed.
tutor working with one tutee?	1.52	
	Variance: 2.30	In numbers ix
Answer key:		the number of
Correct answers may include:	Violations? No	answers has
>Consistent feedback		now been

>Consistent instructions	Comments/Suggestions:	increased.
>Tutor can develop in his/her role	Seem very simple and there would	Suggested
>There is time for the tutor-tutee relationship to develop	no reason to understand the course	disadvantage
	material before the test.	was added.
Q.6: Suggest two possible disadvantages of Mr. Bartley employing a	For question 8 I do not think the	
one-to-one peer tutoring format?	tutee will feel isolated I think the	
Answer key:	opposite with 2-3 tutors trained to	
>Tutee's own learning may be effected if his/her individual practice	work with him/her 1:1. The tutee	
time decreases	will never have to be alone in class	
>Only one student gains the benefits of being a tutor	or left without a partner. AND they	
	won't have to partner with the aid	
Q.7: Mr. Bartley considered using a group of tutors, who would rotate		
and work with John. What are four possible advantages of this	# 6 increase the disadvantages from	

format?	2 to 3 or more. For example, another
Answer key:	disadvantage is if the tutor is absent
>Tutors will have increased time for their own individual practice	John will be without a tutor.
>The tutee will socialize with more than one tutor	So far, all the questions related to a
>The tutee will not be without a tutor, if a tutor is absent	low level of critical thinking
>More students can gain the benefits of being a tutor	
Q.8: Suggest two possible disadvantages of rotating a group of tutors	
instead of just Sarah being the tutee?	
Answer key:	
>There may be a lack of consistency between tutors	
>The tutee may feel isolated"	

"Please respond to the following	
statement:	
The above question is effective in	
assessing the students' learning for	
objective 3? "	
9 10 10 7 10	Grammatical
	error corrected
Mean: 9.20	
SD: 1.30	
Variance: 1.7	
	statement: The above question is effective in assessing the students' learning for objective 3? " 9 10 10 7 10 Mean: 9.20 SD: 1.30

The tutee has selected the tutor	Violation: No	
The tutor volunteers for the position		
Answer: D"	Comments/Suggestions:	
	Has a tutor they that needs to be	
	corrected	
	To me this is the most important	
	variable of any of the characteristics	
	of a peer tutor	
	A singular/plural problem	
Objective 4: Learners will know how to prepare the class for peer	"Please respond to the following	Grammatical
tutoring (Lecture 15)The following questions will assess the	statement:	error
students' learning for this objective:		corrected.

	The above questions are effective in	
Q.10. List the five important steps that must be done when preparing	assessing the students' learning for	The
for peer tutoring: Answer Key:>Choose a peer tutor program >Choose	objective 4? "	opportunity for
a peer tutor	10 5 10 6 8	children with
>Obtain permission from parents of involved students		disabilities to
>Prepare the class for peer tutoring (develop		talk about what
understanding/friendliness)	Mean: 7.80	they want was
>Train the tutors	<i>SD</i> : 2.28	included under
	Variance: 5.20 d	
Q.11. List four preparation activities Mr. Bartley could have employed		awareness;
prior to beginning the peer tutoring program?	Violation: Yes	however for
Answer key:		extra
>Disability awareness discussion	Comments/Suggestions:	clarification,

	this response is
Seems just straight memorization	now added to
and the number on the list equals	the answer key
the if responses?	also.
"Question 10 choose peer tutorS	
(you missed the s)	
Question 11 you could have former	
or current peer tutors come in and	
speak as well as the children with	
disabilities talking about what they	
want and are looking for!"	
Again a critical thinking question.	
Also number 4 is not clear.	
a t () () () () () () () () () () () () ()	and the number on the list equals the if responses? 'Question 10 choose peer tutorS (you missed the s) Question 11 you could have former or current peer tutors come in and speak as well as the children with disabilities talking about what they want and are looking for!" Again a critical thinking question.

Answer key:	Violation: Yes	presented in a
fulfill as John's tutor:		as each is
Q.12. Give an example of two roles that Mr. Bartley may train Sarah to		the PD course
	9 10 10 <b>5</b> 10	is made clear in
objective:	objective 5?"	different; this
The following questions will assess the students' learning for this	assessing the students' learning for	roles were
	The above questions are effective in	how rules and
rules. (Lecture 21 & 23)	statement:	it was clear
Objective 5: Learners will be able to train tutors in their roles and	"Please respond to the following	The PI believed
	disabilities."	
	diversity of individuals with	
	inspirational videos showing a	
	Q.11. Change third point to: "Watch	

Roles may include:		separate
>Communicate/socialize with John	Mean: 8.8 SD: 2.17 Variance:	section.
>Instruct John	4.70	
>Provide feedback to John		
>Motivate John		
	Comments/Suggestions:	
Q.13. Give an example of a rule that Mr. Bartley may set for Sarah,	roles and rules unclear.	
John's peer tutor.	Then roles are addressed?	
Answer key:		
"Correct rules will relate to ensuring the peer tutoring program		
occurs in a safe and respectful manner."		

Objective 6: Learners will be able to train tutors in appropriate	"Please respond to the following	
communication strategies. (Lecture 24)	statement:	
	The above questions are effective in	
The following question will assess the students learning for this	assessing the students' learning for	
objective:	objective 6? "	
	8 5 5 10	The question
Q.14. Why should communication be a component of tutor training?		has been
Answer key: Correct answers will refer to increased socialization as	Violation: Yes	removed.
being a benefit of peer tutoring and necessary for an inclusive		
physical education class."	Mean: 7	
	SD: 2.45	
	Variance: 6	
	Comments/Suggestions:	

Do you plan on making this one
open ended?
I suggest perhaps asking the
students to make a list with specific
examples.
Communication is two ways. The
tutor must convey the information
to the tutee in his/her mode of
communication AND know how to
interpret their expressive
communication whether it is an
IPAD, sign, or gestures.
Communication for socialization is

truly only part of training for
communication. This part must be
elaborate on
"I believe you need to expand on
the reasons and consequently the
answers to why communication in
peer tutoring is an important
component. For example, effective
communication can result in better
learning for the tutee.
Also are you going to discuss the
different ways communication can
be offered by tutor. For example,

verbal, demonstrations, visuals
physical guidance.
For these reason I believe you
should revisit this section in
assessing communication and
expand on it
low level of critical thinking.
Obj. 6: unrated: communication
goes both ways
Obj. 6: rated as 5: expand on
reasons and consequentlt the
ansers are you going to discuss the
different

	Obj 6: rated as 5 low level of critical thinking.	
Objective 7: Learners will be able to train tutors in appropriate instructional strategies (Lecture 26) The following questions will assess the students learning for this objective:	<ul> <li>"Please respond to the following statement:</li> <li>The above questions are effective in assessing the students' learning for objective 7? "</li> <li>10 10 8 10</li> </ul>	Visuals have now been included.
<ul><li>Q.15. Provide an example of an instructional framework that Mr.</li><li>Bartley, may train Sarah to follow when working with John.</li><li>Answer key: The instructional framework may include 'verbal</li></ul>	Violation: No	

instruction, demonstration, providing feedback, and specific	
instructional strategies'	
Q.16. Prior to training Sarah in instructional strategies, how should	Mean: 9.5 SD: 1 Variance: 1
Mr. Bartley determine what instructional strategies to teach her to	
use with John?	Comments/Suggestions:
Answer key:	#15 include visuals on the list of
Allow the tutor to choose from a range of strategies	instructional framework
Physical prompts	Really referred to as an instrument
Strategies that have previously worked with the John	framework?
Visual instructional Strategies	
	Obj 7. unrated instrument frame
Answer: "C"	

Objective 8: Learners will be able to train tutors in providing	"Please respond to the following	
feedback. (Lecture 31)	statement:	The suggested
	The above questions are effective in	change was
The following questions will assess the students learning for this	assessing the students' learning for	made: Now the
objective:	objective 8? "	participant is
	8 3 10 3 10	asked to
Q.17. Now that Sarah is John's tutor, what two types of feedback		provide two
should she be providing to him?	Mean: 6.8 SD: 3.56 Variance:	examples of
Answer Key:	12.7	general and
She should provide general and specific feedback "		two examples
	Violation: Yes	of specific
		feedback.
	Comments/Suggestions:	

	Why not ask the students to identify	
	two examples of general and two	
	examples of specificasking to	
	identify two categories is not very	
	specific Also verbal and non verbal	
	are very important too!	
	very simple and concrete	
Objective 9: Learners will be able to train the tutors to motivate the	"Please respond to the following	
tutee. (lecture 32)	statement:	
	The above questions are effective in No edit	ts
The following questions will assess the students' learning for this	assessing the students' learning for necess	ary.
objective.	objective 9? "	
	10 9 8 6 10	

Q.18. Give an example of two motivational strategies that Mr Bartley	
could teach Sarah to use to motivate John?	Mean: 8.6 SD: 1.67 Variance: 2.8
Answers may refer to Sarah being positive, using a reward system or	
using assessment items.	
	Violation: No
	Comments/Suggestions:
	Goal setting too!
	It is not clear to me how using
	assessment items are motivational.
	Need to further clarify
	Using assessment items?
	Using assessment items?

Objective 10. Learners will be able to implement a safe and successful	"Please respond to the following	
peer tutoring program. (Lecture 38,40 & 41)	statement:	The experts
The following questions will assess the students' learning for this	The above questions are effective in	suggested has
objective.	assessing the students' learning for	already been
	objective 10? "	included in the
Q.19. What are four indicators of a successful peer tutoring program	8 8 10	course content:
that Mr. Bartley should look out for?		ie. It is
Answer key:	Violation: No	suggested that
>Increased tutee learning		the tutee is
>Increased tutee social interaction		involved in the
>Increased on-task behavior	Mean: 8.67 SD: 1.15 Variance:	training
>Increased, or no change, in the tutors learning Q. 20.	1.33	procedures.

Q.20. After a PE class John informs Mr. Bartley that he feels self-	
conscious about having a peer tutor. What are three steps that Mr.	
Bartley can take to rectify this?	
Answer:	Comments/Suggestions:
>Rotate the tutors	I would add the Mr Bartley include
>Use reciprocal peer tutoring	Sarah in the 3 steps for Q21have
>Use tutoring for select activities only	her there with him when developing
	the cheat sheet and simplifying
Q.21. During a PE class Mr. Bartley notices that Sarah is not	instructional framework.
implementing the instructional strategies learned in training. What	For question 21 he can also model
are three steps that Mr. Bartley can take to rectify this?	the instruction and feedback he is
Answer:	looking for! In the training do
>Retrain the tutors	scenarios WITH the tutees.

>Make a cheat sheet	The tutees should be part of the	
>Simplify the instructional framework"	training too!	
	Instead of making a cheat sheet	
	perhaps state provide Sarah with a	
	rubric or task analysis skill sheet	
	along with examples of feedback	
	statements? "look out for? correct	
	term?	
	Q 19: low level of critical of	
	thinking"	
"In addition, the following questions assess the students learning on	"Please respond to the following	
several objectives (cross objective assessment)	statement:	No action
	The above questions are effective in	required.

Q.22. In Mr. Bartley's peer tutoring program which of the following	assessing the students' learning for
may be critical for a successful program? (select all that apply)	multiple objectives? "
Answer key:	10 10 10 10 10
Skilled tutors	
Continued support for the tutor	
Tutor training	Mean: 10 SD: 0 Variance: 0
d Whole-class peer tutor	
Answer: B and C	
	Violation: No
Q.23. Mr. Bartley's training sessions with Sarah, were key to the	
success of the program. List the important components of this peer	
tutor training?	

Answer Key:		
Correct answers will include:	Comments/Suggestions:	
Roles of the tutor		
Rules for the tutor	Good job!	
Training in communication strategies		
Training in instructional and feedback strategies	22. Will a training tutor be doing	
Training in motivational strategies	most others?	

### APPENDIX O

#### **Self-Report Directions**

Section 1:

- 32. Did you choose a tutee?
- 33. If you did not choose a tutee or do not want to apply peer tutoring in your class now, please provide a rational for your answer.
- 34. Did you choose a tutor/s?
- 35. If you answered yes; did the tutor/s volunteer for the position?
- 36. Did you prepare the class for peer tutoring?
- 37. If yes (you did prepare your class for peer tutoring) what strategy did you use and why did you choose this strategy?
- 38. What format of peer tutoring did you choose?
- 39. Please provide a rationale for your choice of format (or your decision to not choose a format)

Section 2:

- 40. Did you train your tutor in their roles?
- 41. If yes, you did train your tutor in their roles, what roles did you choose for them to fulfill?
- 42. Did you provide rules for your tutor?
- 43. If yes, you did provide rules, what rules did you include?
- 44. Did you train your tutors in communication strategies?

- 45. If yes, you did train your tutor in communication strategies, which strategies did you include?
- 46. Did you train your tutors in instructional strategies?
- 47. If yes, you did train your tutors in instructional strategies, what strategies did you include?
- 48. If no, please explain why.

#### Section 3

- 49. Did you train your tutor/s in providing feedback?
- 50. If yes, you did train your tutors in providing feedback, please explain what was involved in this training?
- 51. Did you train your tutor/s in providing motivation to the tutee?
- 52. If yes, you did train your tutors in providing motivation, please explain what was involved in this training?
- 53. Did you use scenarios to train your tutors?
- 54. If yes, you did use scenarios to train your tutors, give an example of one of these scenarios.

# APPENDIX P

# Self Report Rubric

Component	Question	Answers	Points on offer (*denotes used for audio recordings also)
Preparing for Pe	er Tutoring		
Choosing a tutee	Completed?	Yes	1
Choosing a tutor	Completed?	Yes	1
		One-to-	
Format of peer	What format of	one/rotating	
tutoring	peer tutoring did	group and	1
program	you choose?	rationale	
		provided	
	Did you prepare		
Class	the class for peer	Yes and list one	
preparation	tutoring and, if so,	of the suggested	1
activity*	what strategy did	strategies	

you use?

Points required		309
for adequate	4/4	
preparation		
Training the tutor		

Roles*	Were roles laid out for tutor? (Roles determine the inclusion of the below training components)	Yes and define	1
Rules*	Were rules laid out for the tutor?	Yes and define	1
Communicatio n strategies*	Were communication strategies included in training?	Yes	1
Instruction*	Were instruction strategies included in	Yes	1

Feedback*	Were feedback strategies included in training?	Yes and defined	1
Motivation*	Were motivation strategies included in training?	Yes and defined	1
Scenarios* Points required for adequate preparation	Were scenarios used in training?	Yes and defined	1 3-7/ (depending on the teacher's choice of how many roles the tutor
			would fulfill)

# APPENDIX Q

# **Perceptions of Professional Development Survey**

For each question, choose the 3 is disagree and 4 is strongly This professional development	disagre	
		1 4
Interesting	-	
organized	-	
helpful	-	
boring	-	0
informative	-	
For each question, choose the 3 is disagree and 4 is strongly		r that best shows how you feel about the following statements. 1 is strongly agree; 2 is ag
3 is disagree and 4 is strongly	disagre	
I learned a lot about peer tutoring from this training		
This training wasn't worth the amount of time it took	-	Q
I would recommend this training to a colleague	-	Ū
I will use the strategies learnt in this course to implement peer tutoring in my class	-	
I enjoyed participating in this training	-	Ū
The video podcasts were effective in providing the information	-	Q

What I liked least about this professional development course was...

What I liked best about this professional development course was...

If you did not implement the activities in this course to your class, please provide a rationale.

Other comments (optional)...

## **Demographic Questions**

- The following questions will help us to understand your experience and situation to ensure the course we offer is as relevant as possible.
- First Name:
- Last Name:
- What state are you currently working in?
- Which statement best describes your current work situation (you may choose more than one):
- I am an elementary school physical education teacher
- I am a middle school school physical education teacher
- I am a high school school physical education teacher
- I am an adapted physical education specialist
- I am a completing my undergrad/master degree in physical education
- Other
- What is your experience in using peer tutors in your physical education classes?
- I have never used peer tutors in my classes
- I have used untrained peer tutors in my classes
- I have used trained peer tutors in my classes
- Other
- What is your motivation for learning about implementing a peer tutoring program?
- For how many years have you been teaching physical education?

Do you perceive any barriers that will prevent you from effectively <sup>313</sup>
 implementing a peer tutoring program in one of your physical
 education classes? If so, what are these barriers?

•