Original Article

Review of online learning in physical education teacher education (PETE) program

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Abstract:
Online Education in Physical Education Teacher Education (PETE) is discussed continuously on its implication for quality of the education (Goad & Jones, 2017). The purpose of this study is to review the studies on the online learning effectiveness in universities and PETE programs addressing three questions: (a) what is the rationale for using this teaching environment in terms of satisfaction, cost effectiveness and general effectiveness, (b) what do experts and research studies say regarding the best practice in creating an online environment, and finally, and (c) what direction should one take to infuse disability concepts in PETE program via online supplement. Relevant research regarding on online education was found by searching the Educational Resources Information Center (ERIC) for primary research material. 11,503 studies were searched by searching term " online instruction". Similarly, 12,359 studies were found with "distance education", and 2,934 studies were searched with "e-learning". The findings of review show that online learning could be seen as effective as face-to-face learning in cognitive performance and student satisfaction. However, it claims that the extra time that both teachers and learners put in for a course in an online environment, excludes online education from being undervalued as a second-rate education. To develop a successful online learning environment, several aspects need to be considered such as, curriculum development for online education, faculty training and support, and student support. More specifically, online PETE online modules should be designed on enhancing not only understand the content area but also provide rich experiences to prepare future PE teahers.
Key Words: **Online learning environment, Physical Education Teacher Education, Infusion Approach Curriculum, Online supplement**

Introduction

With the growing trend moving away from policies of segregation, the number of students with disabilities who are being included in general education settings continues to increase (Shogren, McCart, Lyon, & Sailor, 2015). Based on the most recent data, 95 percent of students with disabilities who are aged from 6 to 21 are included in general education setting (U.S. Department of Education, 2018). However, since findings indicated that General Physical Education (GPE) teachers have not been adequately prepared to work with students with disabilities (An &Meaney, 2015; Kuntz, E., & Carter, E., 2019), it is doubtful that Physical Education Teacher Education (PETE) programs in higher education provide the appropriate training to PETE students regarding dealing with students who have disability and are in their GPE classes.

In the early 1990s, apprehension about the inadequate state of teacher's preparation in working with students with disabilities in GPE classes prompted studies that used the infusion approach in PETE programs. The infusion approach is an approach that infuses the disability concept into the overall PETE curriculum; this means that teaching and training programs like PETE and APE would no longer provide a segregated curriculum (Kowalski, 1995). For example, there are Adelphi University (NY) and Washington State University, two schools who integrated the infusion model into their PETE program (DePauw &Goc Karp, 1994). They applied several methods in integrating the infusion model into their program like inviting guest lecturers, providing practicum, and using simulations to enhance understand of certain concept of disability. Through the ensuing experiences, students were exposed to many different instructional strategies and activity modifications. The modifications were provided daily to encourage students to individualize instruction when planning their own lesson. Students were also asked to simulate their own lesson plan. The West Chester University (PA) invited guest speakers into their courses, courses such as the foundations of physical education (Lepore& Kowalski, 1992). Even though universities and faculties are starting to infuse disability concept in PETE program, there have been a lot of barriers in this process such as the time taken and the cost. According to Rizzo & Kirkland (1995), PETE curricula must be changed to make the new infusion approach curriculum happen claiming the needs of alternative instructional methods.

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There has been lots of research to find alternative instructional methods to meet the needs of universities and students. To overcome the barriers, online education is used to enhance the general education curricula (Smith & Southern, 1999; Smith & Jones, 1999). Integrated in as learning modules, special education issues can be infusedin traditional elementary and secondary preparation (Smith &Meyen, 2003). Many institutions of the higher education provide the online courses in their degree programs integrating multimedia and network. There are a long well-established history of studying the efficacy of teaching and learning through the medium of the Internet, the research outcomes are varied (Campbell, Floyd, & Sheridan, 2002). Several studies indicated there was no differences in cognitive factors such as academic performance (Creswell, 2012; Naber& LeBlanc, 1994). However, other factors such as students' satisfaction revealed mixed results. Richie and Newby (1989) and Pirrong&Lathen (1990) found that students in traditional classrooms were more satisfied with their learning than students in online learning were. On the other hands, many studies found the students' attitudes favorable to online learning (Goodwin, Miklich& Overall, 1993; Naber& LeBlanc, 1994). Different studies showed different opinion on satisfactions regarding the two different types of learning.

The purpose of this study is to review the previous researches that investigated the effectiveness of online learning in higher education and PETE programs. The study addresses three questions: (a) what is the rationale for using this teaching environment in terms of satisfaction, cost effectiveness and general effectiveness, (b) what do experts and research studies say regarding the mot effective practice in developing an online environment, and finally, and (c) what direction should one take to infuse disability concepts in PETE program via online supplement.

Methods

Relevant research concerning online instruction in higher education was found by searching the Educational Resources Information Center (ERIC) for primary research material. In order to find the relevant studies were not missed, the search term remained broad. The search terms were "e-learning" and "distance learning" searched specifically in the title or abstract. According to the studies, the differences between face-to-face instruction and online learning are analyzed mainly in terms of cost effectiveness, students' satisfaction, and outcome.

The detailed examination was conducted to search the papers, which included the terms, "higher education", "teacher training", "special education", and "physical education" to review the studies in the field of teacher education. The quality check was conducted to assess the methodological quality and risk of biased within selected studies, two expertise in online education made the quality check. After these scanning procedures, 11,503 studies were selected with the search key word "online education". Similarly, 12,359 studies were selected with "distance education", and 2,934 studies with "e-learning".

Results

Why online learning?

The use of e-mail and the Internet, coupled with Web-based course works, has become a core method of instruction, particularly in higher education (Derrick, 2003). Online learning involves the use of network technologies, such as the Internet for delivering, supporting, and assessing formal and informal instruction as described in Table 1 (Shank &Sitze, 2004). One of main reasons to use online learning is access and flexibility: People can log in at any computer terminal, at home or at work, at any time of day or night, to complete a lesson or refer to learning materials. Faster delivery and cost saving is another reason to choose an online learning environment. For organizations that need to convey targeted information that quickly becomes outdated (for example, the newest version of a product), online modules are almost always faster and cheaper than flying trainers across the country and requiring learners to sit in a classroom for a set number of hours (Aragon, 2003). Also, the current academic and business environments in the global economy view the implementation of online education and training program as a necessary avenue for training and implementing programs across the global network (Bartley &Golek, 2004). Changes in society along with the increasing need to train and retain people means that the need to teach and learn with flexibility will only grow (Shank &Sitze, 2000).

Table 1.

Online Learning makes sense for organizations when:	Online learning makes sense for learners when:
People are comfortable using technology for information and learning needs.	They want and need to learn this way
Learning access is improved as a result.	They have access to the technology.
Learning generally-and technology-bawed learning specifically-is vocally and visibly supported by key stakeholders and given the resources to succeed.	They have enough time and skills to use the technology
	They perceive it as adding value to their work and lives.
	They have support to help them with technology issues.
Online learning may be a bad idea for organizations when:	Online learning may be a bad idea for learners when:
"Everyone else is doing it" is the reason for doing it.	They aren't comfortable with technology.
It doesn't fit into the organizational culture or processes.	They don't have access of time.
Resources and support are insufficient.	They need more interaction or support than will be provided.
	They are unable or unwilling to lwearn this way

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For these reasons, the last decade has pushed institutions of higher education around the world to recognized that online learning could be an alternative (or supplement) to traditional, classroom instruction (Larreamendy-Joerns&Leinhardt, 2006l Tallent-Runnels et al., 2006). For example, the Sloan Consortium conducted the annual survey of 2,500 U.S. colleges and universities conducted by the Sloan Consortium claiming online enrollments have more than doubled from an estimated 1.6 million students in 2002 to 3.9 million students in the fall of 2007 (Allen & Seaman, 2008). What is more, in just one year (2006 to 2007) online enrollments in U.S. postsecondary institutions grew by 12.9 %, a rate far greater than that of the overall higher education population (Allen & Seaman, 2008).

Compare online vs. traditional face-to-face learning environment
There are numerous researches have conducted to compare cognitive aspects such as, academic performance, achievement, examination results and grades in online learning in general found no differences among the different cognitive factors (Weingand, 1984; McCleary& Egan, 1989; Pirrong&Lathen, 1990; Souder, 1993; Naber& LeBlanc, 1994; and Carswell, et al. 2000).

Cognitive achievement. Campbell and his colleagues (2002) studied students' performance and attitude regarding courses taught online and courses taught onsite. Mean of the comprehensive exam was used for measuring academic performance. The total number of participants was 134; 120 students who took the onsite course, and 14 students who took the course online. All participants answered 40 multiple choice questions covering 12 chapters. Results of the test revealed the average of onsite students as 24.4 (64%), while students who took the online course responded an average of 31.3 questions correctly (78.3%). This difference is the most statistically significant finding ($p = 0.01$) in the study. In the student course and instructor evaluation, one question had a significant difference of 0.05 Students in the online course felt that they had better interaction with the instructor, and that the instructor was more available/approachable for dealing with course questions, problems and issues.

In teacher preparation course, Smith, Smith, & Boone (2012) questioned the effectiveness of lecture, guided instruction, and collaborative discussion between online and traditional classroom environment in teacher preparation programs. The course used technology in the general curriculum classroom. This course also offered an overview of computer-based technology integration for students majoring in special education, elementary education, or secondary education and preparing to teach in an inclusion environment. There are two lecture formats, online and traditional. For the guided instruction, the online group took software packages, and the instructor used a projection device to display the instructor's computer screen for all to see. For the collaborative discussion, traditional group took the traditional in class discussion session, online group used the digital class room discussion, and in online discussion, all students were asked to contribute to the discussion. Fifty-eight pre-service education students participate in the study. Each participant was enrolled in one of two concurrent offering courses. Measured quisi-experimental, repeated-measures design, all students received both control and experimental conditions and treatment, Data were collected pretest, and posttest. A repeated measure ANOVA was conducted on the pretest and posttest data from the interventions. Notable differences between traditional and online instruction were observed in discussion activity. It appears a significant number of students in the traditional collaborative discussion chose not to participate in classroom discussion. As the data illustrated, 100% online participants contributed to the discussion. These findings are similar to previous investigations, which found that student participation increased when instruction was presented via online format (Hiltz, 1986; Jaeger, 1991; Riel, 1994). For example, another investigation of student online discussion by Harasim (1990) found that student participation and involvement in online discussions were as a result of increased opportunity and access providing more time for students to formulate ideas and contribute response.

Connie & Cheung (2007) compared effectiveness of in class online discussion and face to face discussion. The face to face group had an in class discussion session, and the online group had a digital classroom discussion where all students were asked to contribute to the discussion. Fifty-eight pre-serviced education students participate in the study. Each participant was enrolled in one of two concurrent courses. In the measured quasi-experimental, repeated-measures design, all students received both the control and the experimental conditions and treatment. Data was collected pretest, and posttest. A repeated measure ANOVA was conducted on the pretest and posttest data from the interventions. Notable differences between the traditional and the online instruction were observed in discussion activities. It appears that a significant number of students in the traditional collaborative discussion chose not to participate in the classroom discussion. As the data illustrated, 100% of the online participants contributed to the discussion. These findings are aligned with previous investigations, which have found that student participation increased when the instruction was presented via online format (Hiltz, 1986; Jaeger, 1991).
Another investigation of student online discussion by Harasim (1990) found that student participation and involvement in online discussions were a result of increased opportunity and access, providing students with more time to formulate ideas and contribute a response. Spooner and his colleagues (1999) summarized the existing research in online learning and revealed that there are no differences between online and traditional face-to-face learning courses in regards to students' outcome. In comparative studies, Russell (2001) and Saba (2000) also found that there is no significant difference in learning outcome between two groups. Ramage (2001)

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found similar results but cautioned that the multitude of variables, which influence learning and cognition, may rule out any definitive answers to the question of which methodology is most effective. There are studies to figure out the variables that affect the outcomes. For example, Brown and Liedholm (2002), in a similar comparative course study (N=710), noted that performance difference might be attributed to differences in student effort. Students in the face to face class spent 3 hours in class each week, while the online and hybrid course students reported spending less than 3 hours per week on the course.

Student satisfaction. In addition to learning outcomes, researchers were also interested in affective domain satisfaction, e.g. students' attitudes. The researchers, interested in students' perceptions of their own learning experience and perceptions of various learning activities via online learning using descriptive methods (Alhous, 1997; Edwards & Fritz, 1997; Hansen &Gladfelter, 1996; Richards & Ridley, 1997; Sullivan, 2002), revealed that participants in their study showed positive perceptions of learning outcomes and the learning environment.

Johnson et al. (2000) compared a graduate online course with an equivalent course taught in a traditional face-to-face format. The researcher pointed out that there must be a great dissimilarity between the two learning environments, and he questioned how to optimize the instructional designs to maximize learning opportunities and achievement in both environments. The purpose of the study was to compare an online course with an equivalent course taught in a traditional face-to-face format. Researchers questioned differences in (a) satisfaction with learning experience (b) student perceptions of student/instructor interaction and course support (c) learning outcomes (i.e., perceived content knowledge, quality of course projects, an final letter grades) of students who enrolled in online and face-to-face learning environments. Student rating of sin Comparisons included student ratings of instructor and course quality; assessment of course interaction and support; and learning outcome measured through course grades and student self-assessment of their ability to perform various tasks. Both courses were taught by the same faculty, delivered by the same department, and required the same content, activities, and projects. Nineteen students were enrolled in each course (N=38). To make sure the groups were equivalent, official university students records were reviewed to obtain a varied demographic of people and academic data for comparison. Student satisfaction was assessed using a course evaluation system. On instructor quality and course quality, both groups provided positive ratings, although the face-to-face group had more positive views than the online group. On student learning outcomes, the grades were, for the most part, equally distributed between the two groups. Students' satisraction toward the instructor quality and course quality were meajured, and both groups showed positive ratings on these two aspects. The mean rating for the overall teaching effectiveness for the face to face group was 4.21 (SD=.79) while the online students' mean rating was 3.58 (SD=1.07). While this difference was significant, the calculated p-value of .346 highlights the need for further research in this area. On perceptions of course interaction, the mean was 3.11 for the face-to-face course and 2.74 for the online course. This difference was significant, t (35) = 2.455, $p < .05$. There was no differences in the variable that examined issues on course structure. The finding of this study show that online learning can be as effective as face-to-face learning in many respects, but students in online programs may be less satisfied with their experience than students in more traditional environments.

Some researchers used correlational research to figure out the relationship between characteristics of learners (Mortensen & Young, 2000; Swan et al. 2001; Wells, 2000). These studies indicated that learner's prior knowledge and experiences in computer related activities, quality of social interactions, and learning styles were all affect on the learners' perception to online learning. Not surprisingly, people with prior experiences and training in computer related fields were more satisfied and comfortable in the online learning environment.

Other aspects. Spector (2005) studied time dimension in online instruction. The researcher questioned if there was a significant difference in outcome, time demands, perceived effectiveness, and perception of benefits between online and traditional environments for both learners and instructors. Three courses were involved in the study; all had an online and a traditional environment, for a total of six courses over a 17 week period. The results revealed that there was no significant difference in outcomes and perspectives throughout the courses. Students put in slightly more time in their online course. However, teachers invested significantly more time on online teaching than in a traditional face-to-face setting. He also pointed out that the time required to design and develop the online course was a primary factor in the cost effectiveness of online instruction. He claims that the extra time that both teachers and learners put in for a course in an online environment, excludes online education from being undervalued as a second-rate education.

Online learning studies in Special Education

In special education, the demand for online instruction rose from the severe shortage of face-to-face programs in the late 1990 (Spooner et al, 1998). Online education specifically addressed the needs of teachers in preparation programs in rural areas (Gruenhagen, McCraken, & True, 1999; Knapczyk, 2001). Most of the studies in special education addressing the effectiveness of online instruction have focused on student perceptions and satisfaction with the instruction. Currently, three-hundred and twenty one studies has been searched regarding online learning in SPED.

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In 2005, Steinweg and his collegues compared online and traditional face-to-face instruction in the Introduction to Special Education course. The purpose of the study was to compare the effectiveness of both online and traditional face-to-face education in Introductory Special Education at East Carolina University. Participants took the intro to sped course .The course has fifty four students total; the first 26 completed the course with the traditional face-to-face environment for 3 hours, once a week for 16 weeks. The second group (n=28) took online sessions in 2 different sections, completed in a 16 week semester. Between the two groups there was no significant differences in age, experiences with students with disabilities, or current working experiences. Pre/posttest measured knowledge personal and attitude. Three skill projects were also used to assess the participants' performance. Written responses to questions regarding the case studies were about addressing the concern for less restrictive environments and community services. It was assessed by the instructor using rubrics. The data was analyzed using SPSS. The knowledge and attitude survey results were compared using the analysis of variance (ANOVA) for repeated measures and tests. There were no difference between two groups in skill projects. The studies inicated the effectiveness of the online study, in fact there are several other studies to describe the online modules in SPED. Smith &Meyen (2003) described a preparation program for teachers of students with severe disabilities. Their model was based on providing materials online while utilizing teleconferencing, face-to-face instruction, and on-site internship. In addition to teachers, behavioral aids combined online learning with chat room threaded discussion to teach graduate level students in a behavior management course in SPED (Alexnader et al., 2007). Recently, studies have begun to address the issues surrounding online instruction in special education. However, still, most of the studies are limited in describing their modules, so that more research is needed to figure out the best online environments in training SPED teachers.

Online studies in Physical Education Teacher Education
Only two studies has been searched with "Physical Education" under "Online education".

First, Tinning & Evans (1994) conducted a case study regarding distance education in physical education. They proposed an Australian model for in-service teacher education. They figured out that the advantage of the online learning in time and space. They claimed that the disadvantage of the online model is student isolation, which means that it is the job of the instructor to provide alternative communication methods. Koh& Bowell (2011) studied how to overcome challenges in distance education such as student isolation and quality issues. They described their online program, The Centa program, at East Carolina University. The Centa program was introduced to graduate PETE program students. To overcome the challenge of reported challenges of the distance education, the program provided both live lectures and recorded lectures. They also had an online chat room to give students a chance to interact with each other.

Pierre (1998) reviewed the literature regarding distance learning in higher education and introduced two success stories in the PETE program. He pointed out the reason why Emporia State University (KS) (ESU) and Kutztown has successful online PE courses. Both schools provided the content materials, assignments, bulletin board, and chat rooms. ESU even provided interactive two-way desktop video conferencing for group communication. Interestingly, Kuztown University conducted activity based course lessons online. This university opened fitness courses allowing students to participate in fitness activities outside of school but during the semester, and the students assessed their performance at the end of the course. The results of the assessment showed that all students improved their fitness level. This shows the importance of design and development in building a successful online learning environment.

Discussions
The results showed the online education could be as effective as face-to-face learning in many perspectives. However, there are still questions on the successful online learning environment implementation. In the sense of these findings, there are several aspects to consider for the future online education.

Creating and implementing an successful online learning environment
Curriculum and instruction. Learning is interactive and dynamic procedure, regardless of the setting in which it conducted. that online instruction can be seen as effective as other instructional methods namely face-to-face instruction. Nonetheless, online instruction may not be suitable for courses that require a high degree of student-instructor interaction (Scheeraens&Blomeke, 2016). The factor that could confirm here is the way in which the curriculum designers integrate solid learning principles into online learning environment (Johnson & Aragon, 2002).

Faculty support. Instructional programs that lead to degrees are organized around substantive and coherent curricula. A standard practice for instructors that teach online programs is the posting of a detailed syllabus on the course Web site. Furthermore, the instructor should include a road map for the course, mainly his or hers expected outcomes (Alonso et al.,2005).
Since, faculty spend tremendous time on course development and maintenance also require a tremendous time commitment as does course presentation in faculty perspectives (e.g. answering emails, providing feedback, and securing chat room availability), the administrators of the universities should understand and support faculty.

       Student support. Research indicates that online students need certain knowledge and skills to successfully participate in online programs (Johnson, Palma-Rivas, Suriya, & Downey, 1999). Institutions who are offering online programs should provide the necessary trainings to the student before and during their participation in an online program.

       Successful online instructor. Even though a certain institution is trying to follow the best practices, the true impact of the learning experience relies heavily on the online instructor (Huber & Lowery, 2002). First, instructors should have a broad array of life experiences and academic credentials so that they can provide real-life examples to students. Some of the better instructors were the program's adjunct professors who were either consultants or teachers. They were active practitioner and brought a wealth of experiences to the classroom especially helpful in providing tips in how to apply concepts in the real world. Second, the instructor's personality should demonstrate a sense of openness, concern, flexibility, and sincerity.

Online instructor should be trained in the online experience. Online instructors n develop new instructional skills (primarily related to the use of technology), as well as refining and augmenting existing skill (feedback, communication, innovation, and courseware design, among others). The educational institution can also assist instructors new to online programs by providing training in the technology, instructional strategies, and teaching methods. Student Support Institutional addresses students' needs as they relate to their academic success and provides the necessary help.

Conclusion

       Although many studies reported admirable cost savings and compatible outcomes in online learning when compared with face-to-face learning (Dyment& Downing, 2020), universities are still struggling with how to make online learning effective (Muir et al., 2019; Martin, Ahlgrim-Delzell, &Budhrani, 2017). It is critical in the question of how to implement all the characteristics of PE and APE into the online learning environment.

       Understanding the content area. This means infusing the content area with the online supplements. For example, when the class focused on how to teach shooting, online supplement should support with modification of equipment and teaching strategies for the student with disabilities. When the class cover behavior management, the online supplement should support the class lesson with examples of behavior managements for students with disabilities e.g. picture schedules, reward systems, and token systems. Since the content area covered by online supplements is closely related with the work done in class, it can enhance students' understanding.

       Facilitate discussion not only online but also face-to-face. The biggest concern about the online course was interaction with faculty and peers. To promote discussion, the instructor should actively use online chatting, open discussion, or conference calls and should also provide chances to discuss the content covered online face-to face. Since this format would act as a supplement to a class, the instructor can also answer questions in class on a regular base.

       Give hands on experiences. The instructor can provide indirect and direct experience using different sources. For the indirect experiences, instructor can provide articles and video clips through uploading the source on the web. They can simply ask students to read or watch and then write short paper. For direct experience, they can observe practicum or do labs that involve shadowing the APE teacher or using a wheelchair to play sports.

To create and implement successful online environment, first of all, university professors should be prepared to meet the challenge of marketing before developing their online course. They can develop a survey with questions about content area in relation to career goals, and the familiarity of online learning, all to analyze the capacity of learners. Finally, it is recommended that an institution should conduct the pilot testing on any new course with one or two good students to work out all the bugs

       Traditional programs will probably never disappear, but the process of learning is changed (Huber & Lowery, 2002). Many institutions impelment online courses as a component of their programs but still require students to complete part of the coursework in residence (Habibi et al., 2018). However, it is sparse in papers using online course in PETE and APE in higher education. It is obvious that online education has the potential for future training in-service teachers to introduce new laws, teaching strategies, and equipment. Future studies should focus on developing modules specifically designed for PE and APE that enhance not only the understanding of the contents but also provides rich experiences for pre-service and in-service PE/APE teachers.

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