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Online training on inclusive physical education: differences in self-efficacy and attitudes of pre-service PE teachers across disability and activity

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Abstract: Online education is increasingly implemented in educational programs. This study aimed to explore the differences before and after an online course on self-efficacy (SE) and attitudes of physical education students towards including children with disabilities in their classes across five categories of disability and three categories of activity context. An online survey was completed pre-course and post-course by 171 (92 females) physical education teacher education (PETE) students, to evaluate their attitudes as well as SE in situational-specific contexts, including fitness training, skill learning, and game participation. The five-question survey was designed to examine attitudes and SE towards including children with severe visual impairment; a prevalent subtype of cerebral palsy diplegia; wheelchair use due to spinal cord injury; Autism Spectrum Disorder (ASD); and intellectual developmental disability due to Down syndrome. At the course onset, participants' SE differed significantly across situations. At the end of the course, their SE had significantly changed only in some situations and disabilities. Their attitudes were significantly changed during the course (p<.001) for severe visual impairment, intellectual disability, and (ASD). However, while utilizing a considerable sample size it was still underpowered to account for changes in SE across disability cases and activity situations. Significant correlations (r>.05; p<.001) were observed between the PETEs' SE and attitudes at the beginning of the course and the difference gained between the beginning and the end of the course towards the inclusion of children with all kinds of disabilities.

Keywords: distance teaching; virtual learning; special education; adapted physical education

Introduction

Online teaching was forced upon the teacher and student population worldwide during the COVID-19 crisis, as a means for enabling ongoing and continuous educational engagement following social distancing requirements (Moorhouse, 2020; Ng, 2020). However, this teaching modality had been recommended even prior to the pandemic, as an alternative to traditional teaching approaches, and as a method that enables greater focus on self-learning (Nodoushan, 2012; Svinicki, 2010). Self-learning, also referred to as self-directed learning, entails active and constructivist processes, during which learners set

goals, monitor and control their actions, and seek knowledge and skills as part of the learning process (Nodoushan, 2012; Svinicki, 2010; Towle & Cottrell, 1996).

Self-learning may occur with or without a teacher, whose role in this process is to guide students on *what* to learn independently, out of the huge pools of information that are currently available, and how to do so efficiently. As such, the role of the teacher is to provide students with learning aids and scaffolding (Svinicki, 2010). Information technology and communications can be used to assist both teachers and learners in the self-learning process, through the storage of knowledge sources and assignments, which can be later accessed by the learners at their convenience; they can also be utilized for facilitating feedback and student-teacher / student-student communications (Clark et al., 2015; McLoughlin & Lee, 2010).

From a systematic review of the literature regarding online learning, before and after the pandemic, 134 empirical studies were extracted. Based on the findings from the reviewed articles three significant contextual factors that impact online teaching and learning practices, were delineated: (a) cognitive presence; (b) teaching presence; and (c) social presence (Carrillo & Flores, 2020). Interestingly, the most recurring theme in the analyzed articles refers to social interactions and discussions among participants. In a different study, award-winning online faculty members recommended using a variety of assessment methods, both traditional and authentic, as well as rubrics, course templates, and quality assurance processes and surveys, learning analytics, and peer reviews – in order to evaluate online course outcomes (Martin et al., 2019).

Inclusive Physical Education Classes

One domain of online teaching that has gained increasing interest in recent years is physical education (PE), especially inclusive and adapted PE (Healy et al., 2017; Ng et al., 2021). Inclusive education in all classes, including PE, is compulsory, as indicated in Articles 24 and 30 of the United Nations Convention on the Rights of Persons with Disabilities (De Beco, 2014; UNESCO, 2020). Although burnout in PE teachers was found to be associated with inclusion challenges (Fejgin et al., 2005; Talmor et al., 2005), in most countries, provisions have been made to include children with disabilities within the regular school system. As a results, teachers have had to adapt to an increasing numbers of students with disabilities in their classes, often without adequate preparation, training, or support (Wilson et al., 2020).

A large amount of evidence has been accumulated and reviewed regarding the impact of inclusion on the behaviors and perceptions of students on physical education teacher education (PETE) programs (i.e., pre-service PE teachers), as well as in-service PE teachers (Block & Obrusnikova 2007; Hutzler 2003; Hutzler et al., 2019; Kiuppis, 2018; O'Brien et al., 2009; Qi & Ha, 2012; Rekaa et al., 2019; Tant & Watelain, 2016; Wilhelmsen & Sørensen, 2017). Collectively, the results of these reviews suggest rather poor adaptation of PE teachers to the inclusive environment. This situation, where children with disabilities are placed in regular PE classes, without providing teachers with adequate support and inclusion practices, has been criticized in the past. Block (1999), for example, metaphorically asked, "Did we jump on the wrong bandwagon?" and 20 years later, such criticism continues (Haegele, 2019).

SE and Attitudes and towards Inclusion in Pre-Service PE Teachers

How teachers deal with the increasing numbers of students with disabilities in their classes can be addressed through two theoretical frameworks: (1) The Theory of Planned Behavior (Ajzen, 1991); and (b) The Theory of Self-Efficacy (SE) (Bandura, 1997). Both theories reflect social-cognitive perceptions of human behavior and explain behaviors over

which people can exercise some extent, of self-control – in addition to environmental influences. Key components of the former theory include behavioral intentions, which in turn lead to actual behaviors. These are influenced by normative environmental expectations, attitudes towards the likelihood of a certain behavior achieving the desired outcome, and the perceived capability of controlling the behavior and its outcomes. The term *attitude* comprises cognitive, emotional, and behavioral perceptions towards a phenomenon and is linked to both environmental aspects and to personal beliefs (Allport, 1935; Antonak & Livneh, 1988; Triandis, 1971). The latter theory further explains the person's task-specific beliefs in their ability to gain mastery and control over the desired behavior. SE is sensitive to the magnitude of the individual's mastering attempts and accomplishments compared to the expectations and actual performance of their peers.

SE provides a feedback loop between perceived and actual control of the behavior. Given their importance in initiating and persevering with a certain behavior, teachers' attitudes and SE have become a popular research target. Studies indicate that teachers with higher levels of SE tend to insist on task completion among students who are considered low-achievers; they also implement more effective strategies for engaging such students (e.g., Gibson & Dembo, 1984; Tschannen-Moran & Hoy, 2001). Moreover, teachers with higher SE or perceptions of competence, regarding their teaching of students with disabilities in a regular environment, have more positive attitudes towards inclusive PE lessons (e.g., Block & Rizzo 1995; Hutzler et al., 2005; Kowalski & Rizzo, 1996).

Measuring SE towards Inclusion in Physical Education

Several tools have been developed to assess the attitudes and SE of pre-service and in-service PE teachers, such as the SE Scale for Physical Education Teacher Education Majors toward Children with Disabilities (SE-PETE-D) (Block et al., 2013). This instrument is based on research findings, whereby children with physical, intellectual, or visual impairments are most challenging for PE teachers in relation to inclusion (Hutzler, 2003). The tool addresses *three types of disabilities*: (1) children with an intellectual disability (ID); (2) children with a physical disability who use a wheelchair (PD); and (3) children with a visual impairment (VI). Next, a pool of items was constructed, including challenges that PE teachers face when striving to include children with such disabilities in their lessons. These items address *three activity situations*: (a) when conducting fitness tests; (b) when teaching sports skills; and (c) when playing sports games. For the three types of disabilities an item pool of 11, 12, and 10 items in the ID, PD, and VI has been constructed. However, to the best of our knowledge, no *comparative analysis* has been reported on PE teachers' SE in these situations.

The item pool of the SE-PETE-D underwent exploratory and confirmatory factor analyses to validate its structure (Block et al., 2013). The tool has also been translated and validated in several languages, including Serbian (Jovanović et al. 2015), Greek (Tekidou et al. 2015), Czech (Baloun et al. 2016), Korean (Kwon & Block, 2017); Spanish (Reina et al., 2019a), Arabic (Hutzler & Shama, 2017), Lithuanian (Selickaitė et al., 2019), and Chinese (Wang et al., 2020).

Quantitative studies have applied the SE-PETE-D scale for examining the SE of PE teachers' when preparing and introducing accommodations for including students with disabilities in their classes. For example, a study on 160 Arabic-speaking PE teachers in Israel – who had completed an academic course on inclusive PE over one semester (3 academic credits) – found relatively low SE scores, i.e., 2.27- 2.65 on a scale of 1-5 (Hutzler & Shama, 2017). In an additional study (Hutzler & Barak, 2017), the SE of 121 Hebrew-speaking PE teachers was measured regarding their including students with various physical disabilities in their classes. The findings indicated moderate SE scores, i.e., 31.45–37.94 on a scale of 10-50. In a more recent study, 229 in-service teachers in Spain also reported low

SE scores, i.e., 2.79-3.46 on a scale of 1-5, prior to intervention that included a six-sessions, which yielded a significant increase among the intervention group, with mean scores of SE increasing to >4 post intervention (Reina, Healy et al., 2019).

In a recent cross-European survey involving nine countries, more than half the 1,651 primary school PE teachers were in favor of an online toolkit with audiovisual resources as a means for supporting their dealing with the inclusion of children with "additional needs" in their classes (Marron et al., 2021). Yet while a considerable amount of evidence has been accumulated regarding the efficacy of face-to-face courses for improving the attitudes and SE of pre-service or in-service PE teachers (for recent reviews, please see: Hutzler, 2019; Rekaa et al., 2019), few studies have quantitatively described the outcomes of *online courses* that are designed to promote inclusive PE classes (Kwon & Block, 2017; Roldan & Reina, 2021).

The aim of the current study, therefore, is to describe the SE and attitude scores of pre-service PE teachers towards the inclusion of children with disabilities in their classes at the beginning and the end of an online course designed to cover the knowledge gap existing in this regard. This would provide new information regarding the situational and disability-specific components that comprise the foundations of situational specific SE and attitude scales, encompassed in the following four research questions and hypotheses:

1. What is the implication of course participation on the attitudes and SE of pre-service PE teachers in the general education system? Based on studies regarding online courses (e.g., Kwon & Block, 2017; Roldan & Reina, 2021) and face-to-face courses (e.g., Hutzler & Shama, 2017; Reina, Healy et al., 2019; Wang et al., 2020), we hypothesized that the online course addressed in this study will have a positive difference, in all disability cases examined, with small to medium effect sizes.
2. What is the difference in the participants' SE across the three activity situations? To the best of our knowledge, no research evidence has been reported on this issue. As such, based on anecdotal impressions obtained during teaching sessions, we hypothesized that significant differences would be seen between activities, with the lowest SE in including students with disabilities in game activities. To examine this question, we first attempted to establish the internal consistency of each activity situation across the different case contexts examined in this study.
3. Does the participants' SE differ across the case contexts? Given previous findings whereby different degrees of SE were seen regarding different types of disabilities (e.g., Hutzler & Barak, 2017; Hutzler & Shama, 2017; Reina et al., 2021), we hypothesized that there will be significant differences in SE across the various case contexts. To examine this question, we strove to establish internal consistency in each case across the different activity situations.
4. What is the association between the teacher's SE and attitudes at the beginning of the course and the change that occurs during the course? Based on the Law of Diminishing Returns from the field of economics, the marginal product of a productive process (i.e., the inclusion course) will, at some point, begin to return a lower outcome for the fixed input (Brue, 1993). As such, we hypothesized that a negative association would be seen between the participants' SE and attitudes towards inclusion at the beginning of the course, yet this would change during the course. As such, we expected to see an initial increase in SE and positive attitudes towards inclusion, followed by a decreasing marginal improvement over the duration of the course.

Materials and Methods

This study included a one-group research design, yet with a large enough sample size that enabled us to add cross-sectional study questions and hypotheses, to uniquely differentiate between the various components of the applied research tool.

Participants

The study was conducted at an academic teacher training college in the center of Israel. All 305 students who had enrolled in the online course *Introduction to Special Population*s (during two consecutive semesters in 2020/21) were asked to participate in an online survey at the beginning and end of the course. This 15-week course was compulsory for 2nd-year Bachelor of Education students on a 4-year PETE program. The students were informed that their participation was voluntarily and that they may drop out of the study at any time, without any consequences whatsoever. The participants provided their informed consent prior to completing the questionnaire. The study was approved by the Ethics Committee at the authors' affiliated Academic Institution (reference nr. 283 from September 14, 2020).

The Survey Tool

The tool that was applied in this study was based on the well-established SE-PETE-D (Block et al., 2013). Considerably high internal consistency has been found in studies that applied the SE-PETE-D scale in a range of languages, such as Reina, Ferriz et al. (2019), who reported Cronbach's α=0.975 for the PD subscale and α=0.93; 9.96 and 0.95 for the ID, PD, and VI subscales respectively in the Spanish version; Alhumaid et al. (2020) reported very high reliability scores for an Arabic version of the SE-PETE-D, in a group of pre-service teachers in Saudi Arabia, with Cronbach's α=0.971, α=0.941, and α=0.965 for the ID, PD and VI sub-scales, respectively. Similarly, Hutzler and Shama (2017) reported very high reliability scores among an Arabic-speaking in-service PE teachers' sample in Israel, with Cronbach's α=0.96, α=0.97, and α=0.98 for the ID, PD, and VI subscales, respectively.

The Hebrew version of this scale also presented high internal consistency, particularly regarding the following case contexts: children with mobility disabilities who use assistive devices (α=0.927) and mobile children who are in a wheelchair (α=0.941). It should be noted that while α scores >.90 are considered excellent (George & Mallery, 2003), when the score is much higher than .90, researchers should consider shortening the scale (DeVellis, 1991). Furthermore, based on an analysis of over 25,000 real-world online surveys, researchers suggest that completion rates are sensitive to the number of questions included in the survey (Liu & Wronski, 2017).

In this study, we retained the SE-PETE-D principles, including the analysis by case context and the scale structure. The three original case contexts were also retained (intellectual and physical disabilities and visual impairment). However, due to the high α scores obtained in Israeli and Arabic speaking samples, the questions referring to teachers' SE were abridged into one item per activity situations (i.e., when conducting fitness tests, teaching sports skills, and playing sports games). In addition to the three case contexts in the SE-PETE-D survey, we added two disability contexts to the questionnaire used in this study, as they are especially relevant to the inclusive environment in Israel: diplegia due to cerebral palsy, which is one of the most prevalent subtypes (Johnsson et al., 2019) and appears to be more liable to exclusion from PE (Hutzler & Barak, 2019), and autism spectrum disorder (ASD). The final case contexts were described as follows: (a) Uri, a boy who has a severe visual impairment (SVI); (b) Yuval, a girl with diplegia due to cerebral palsy (CPD), who can run for a few steps and walk slowly; (c) Moran, a girl who has a spinal cord injury (SCI) due to a traffic accident and uses a wheelchair for mobility; (d) Doron, a boy

with ASD, who typically does not react to teacher's instructions; and (e) Nitzan, a girl with an intellectual developmental disability (IDD) due to Down syndrome.

The information provided on each case context and activity situation was kept short, to reduce the length of the questionnaire and increase compliance. For the first question, which referred to attitudes towards inclusion, the students were asked to rate the following item: "To which degree do I think that this child should study in regular education?" on a Likert-like scale, from 1 (should learn in a special school) to 5 (should learn in a regular school). The following three questions referred to the student teachers' SE regarding each of the three activities that were described in detail in the SE-PETE-D scale (Block et al., 2013). We used one instead of several items to describe each activity: "To which degree do I feel confident in including this child in ball-skill learning?" and "To which degree do I feel confident in including this child in fitness training for ball games?" and "To which degree do I feel confident in including this child in ball games?" Here too, the students were asked to rate each item on a Likert-like scale ranging from 1 (nt at all confident) to 5 (extremely confident).

Course Structure and Content

The online course that was addressed in this study aimed at providing pre-service PE teachers with practical tools and resources for including children with special needs in their classes. The course was created by three experts: two with vast experience in PE teaching in general, and in the inclusion of children in PE classes in particular, and an expert on online education. The course, which was conducted via the college's online Moodle system, was based on two theoretical principles: (a) The Inclusion and Universal Design Theory (van Munster et al., 2019); and (b) The Adaptation Theory (Hutzler, 2007). The course included 10 topics, each covering 1-2 units, with a total of 14 units (Table 1). The theories and topics were presented to the students together with practical tools, accommodations, and examples in relation to disability-specific issues in inclusive PE classes.

Each unit included one or two pre-recorded lectures (about 10 minutes each), using the Vimeo (New York, USA) video-sharing software that enables voice-over PowerPoint presentations, as well as a related assignment or close-ended quiz. The videos and presentations were designed to portray audiovisual materials in a user-friendly manner. Quizzes were followed by immediate feedback and open-ended assignments were followed by general feedback. The students completed the course asynchronously, at their convenience, yet each unit was only available for a two-week period, and specific dates and times were given for each assignment. After completing the course, the students also had to take a multiple choice final exam.

Table 1. Online course program

Topics	Units
Introduction to disability and adaptation in physical activity	1
Inclusion and universal design theories in physical education	2
Adaptation theory and virtual exposure to disability. Simulation: blindfolded running and dribbling	2
Intellectual developmental disability	1
Autism spectrum disorders	1
Cerebral palsy	1
Developmental coordination disorder	2
Spinal cord lesions and wheelchair use	1
Visual impairments	1
Motivational principles to physical activity development	2

Procedure

This was a mixed, cross-sectional, and prospective study whereby results of the online course in relation to a range of variables were monitored, yet with no control group. Students who enrolled in the course during the winter and summer semesters of the 2020/2021 academic year were encouraged to complete the survey questionnaire during the first week and the last week of the course. The questionnaire, which was prepared in a Google document format, was first completed by a focus group of PETE students (N=35), who confirmed the relevance, structure and content of the questionnaire. It was then sent via email to all course participants, with an attached letter explaining that completing the survey is not mandatory, is not a course assignment, and has no influence whatsoever on their grades for this course.

Before presenting the questions regarding inclusion, the students were asked for basic demographic-related information, including gender, and experience working with children and adults with disabilities. Next, the five case contexts were presented, each together with four questions (one relating to attitudes towards inclusion and three relating to SE).

Statistical Analysis

The statistical analysis addressed the five research questions as follows:

1. The basic SE-PETE-D principle for considering each case context separately was maintained; after checking for normalcy, paired t-tests were performed within each case, to examine pre-course to post-course changes in attitudes and SE.
2. Internal consistency for each SE activity situation (i.e., fitness, skill, and game participation) was examined through Cronbach's α across the five case contexts. Next, differences in SE between activity situations were examined, using a one-way ANOVA, based on the mean scores of the three related questions across cases. This was conducted discretely for pre-course and post-course scores. Furthermore, a one-way ANOVA was performed on the change scores (post-pre) to indicate the relative magnitude of change between activity situations.
3. A similar procedure was then conducted for the five disability cases. After establishing internal consistency through Cronbach's α, we evaluated the differences in SE mean scores, at the beginning of the course and at the end, separately.
4. Finally, to examine associations between SE and attitudes at the beginning of the course, and differences in these variables by the end of the course, Pearson correlations were conducted across case contexts and activity situations.

In all t-tests and ANOVA procedures, follow-up post-hoc analyses were conducted using Bonferroni pairwise comparisons of estimated marginal means, to correct for multiple comparisons. Therefore, $p<0.02$ was assumed significant when comparing the means of the three situational task categories, and $p<0.01$ was considered significant when comparing the means of the five cases contexts. Effect sizes (Cohen's d for t-tests and η2 p for ANOVA) were also measured to imply practical significance (Kirk, 1996). The following constituted cut-off values for Cohen's d large>0.8; medium >0.5<0.8; small >0.2<0.5; and trivial <0.2; and for $\eta 2\eta 2$ large> 0.14; medium>0.01<0.06; small <0.01 (Cohen, 1988). Post hoc power analyses were also computed to monitor potential sample size bias.

Results

Of the 305 students who registered for the online course over two consecutive semesters. At the beginning of the course, 261 students completed the study (85.5% response rate); at the end of the course, 251 students completed the study (82.3% response rate). The survey was completed both before and after the course by 171 students, i.e., 56.1% of all students, including 92 females (53.8%). Of the 171 respondents, 51 students (29.8%)

reported having experience in teaching students with disabilities; 121 students (70.8%) reported having an acquaintance of some kind with a person with a disability. Frequency analysis and Kolmogorov-Smirnov tests confirmed data distribution normalcy for all variables.

In light of the positive change observed in some case contexts and activity situations, reliability analysis was conducted across the five case contexts, to present the internal consistency of each activity situation in relation to SE. The outcomes of this analysis revealed good Cronbach's α scores for ball skills, fitness, and game participation for the pre-course assessments (α=.796, α=.795, and α=.782, respectively) and very good Cronbach's α scores for the post-course assessments (α=.855, α=.835, and α=.839) (DeVellis, 1991).

Difference in SE regarding Inclusion

Regarding SE, the pre- to post- changes across the five case contexts are presented in Table 2 discretely for each activity situation, including mean scores for each case context. The outcomes demonstrate significant within-subject improvement in SE for all three activity situations, yet only for the SVI, IDD, and SCI case contexts. However, only SE regarding SVI could be considered a medium effect size (d >.05), while in IDD and SCI it was small and in CPD and ASD trivial or small. Furthermore, post hoc power analyses revealed strong power for SVI, ASD and IDD (0.99 for all) and lower power for SCI and CPD (0.52 and 0.51, respectively).

Table 2. Pre- to Post-Course Self-Efficacy Scores by Case Contexts and Activity Situations

	Task	Pre		Post		95% CI		t	*p*	Cohen's *d*
		Mean	SD	Mean	SD	Lower	Upper			
SVI	Ball skills	3.05	1.18	3.67	1.07	-0.822	-0.429	-6.29	**< .001**	**0.55**
	Fitness	2,85	1.25	3.67	1.1	-1.035	-0.591	-7.22	**< .001**	**0.7**
	Ball games	2.59	1.21	3.43	1.14	-1.05	-0.622	-7.72	**< .001**	**0.71**
	Mean	2.83	1.07	3.59	0.99	-0.94	-0.58	-8.24	**< .001**	0.63
CP	Ball skills	3.70	1.01	3.82	1.94	-0.283	-0.49	-1.39	0.166	0.12
	Fitness	3,36	1.04	3.48	1,13	-0.309	0.075	-1.201	0.231	0.11
	Ball games	3.21	1.12	3.49	1.05	-0.46	-0.102	-3.1	**0.002**	0.06
	Mean	3.43	0.92	3.6	0.98	-0.32	-0.02	-2.22	**0.030**	0.17
ASD	Ball skills	3.46	1.14	3.48	1.02	-0.207	-0.172	-0.18	0.855	0.02
	Fitness	3.41	1.15	3.51	1.06	-0.272	0.074	-1.134	0.258	0.09
	Ball games	3.23	1.18	3.35	1.08	-0.299	0.077	-1.17	0.244	0.11
	Mean	3.37	1.15	3.44	0.98	-0.24	0.09	-0.91	0.360	0.07
IDD	Ball skills	3.37	1.17	3.64	1.05	-0.444	-0.094	-3.03	**0.003**	0.24
	Fitness	3.37	1.16	3.59	1.06	-0.393	-0.051	-2.57	0.011	0.2
	Ball games	3.23	1.16	3.54	1.06	-0.482	-0.126	-3.374	0.001	0.28
	Mean	3.37	1.08	3.59	1.01	-0.43	-0.1	-3.26	**0.001**	0.25
SCI	Ball skills	3.59	1.23	3.83	1.02	-0.437	-0.43	-2.4	**0.017**	0.21
	Fitness	3.29	1.24	3.51	1.14	-0.423	-0.034	-2.31	0.022	0.18
	Ball games	3.23	1.27	3.51	1.13	-0.498	-0.075	-2.67	0.008	0.23
	Mean	3.33	1.09	3.62	1.01	-0.43	-0.07	-2.75	**0.007**	0.21

Note: Bold = statistically significant scores or medium effect-size; 95% CI = 95% confidence interval; SVI = severe visual impairment; CPD = Cerebral palsy diplegia; ASD = autism spectrum disorder; IDD = intellectual and developmental disability; SCI = spinal cord injury

Difference in Attitudes towards Inclusion

Regarding attitudes towards including children with disabilities in the respondents' PE lessons, Table 3 presents pre- to post- changes across the five case contexts. Significant

improvements (p<.001) were seen for SVI, ASD, and IDD. However, here too, the effect size could only be considered medium for SVI, while ASD and IDD could be considered small and CPD and SCI trivial.

Table 3. Pre- to Post-Course Attitude Scores across Case Contexts

Case context	Pre		Post		95% CI		t	*p*	Cohen's *d*
	Mean	SD	Mean	SD	Lower	Upper			
SVI	2,90	1.34	3,60	1.27	-0.901	-0.491	-6.694	**< .001**	**0.54**
CPD	3.95	1.14	4.12	1,07	-0.371	0.032	-1.664	0.098	0.15
ASD	2.49	1.29	3.04	1.25	-0.754	-0.334	-5.117	**< .001**	0.43
IDD	2.42	1.38	3 .02	1.39	-0.819	-0.386	-5.498	**< .001**	0.43
SCI	4.11	1.19	4.26	1.00	-0.314	0.01	-1.851	0.066	0.14

Note: Bold = statistically significant scores or medium effect-size; 95% CI = 95% confidence interval; SVI = severe visual impairment; CPD = Cerebral palsy diplegia; ASD = autism spectrum disorder; IDD = intellectual and developmental disability; SCI = spinal cord injury

The Magnitude of SE Change across Activity Situations

Following the Cronbach's α scores observed within SE for all activity situations, from the one-way ANOVA there was a significant difference with a large effect size between ball skills (M=3.43; SD=0.85), fitness (M=3.25; SD=0.87) and ball games (M=3.10; SD=0.87) at the beginning of the course (F=23.13, p<0.001, η^2_p=0.215). A similar significant difference with a large effect size between ball skills (M-3.69; SD=0.81), fitness (M=3.55; SD=0.87), and ball games (M=3.46; SD=0.86) was also seen at the end of the course (F=22.79, p<0.001, η^2_p=0.212). The score in Ball skills was highest and in ball games lowest in both points in time. Post hoc analysis with Bonferroni adjustment was used to compare the three activity means both at the beginning and at the end of the course. Results show significant differences between the three activities at the beginning of the course (p<.001 for all comparisons) as well as at the end of the course (p<.001 for the difference between ball skills and ball games, and p=.023 for the difference between fitness and ball games).

In addition, a one-way ANOVA was conducted to compare the magnitude of the change between pre and post SE scores (post minus pre; calculated across all case contexts) between the three activities Based on the outcomes a non-significant difference (p=0.053) was computed between the three mean activity change scores. However, based on the low effect size (η^2_p=0.02) found for this comparison (i.e., two measurement points in time and three activities) the current study power to reveal such a difference was low (0.07).

Differences in SE across Case Contexts

We also examined which case contexts posed the greatest challenge to the students' SE, and which presented the greatest pre-course to post-course changes. First, we performed Cronbach's α analyses to examine the internal consistency of the mean scores. The results indicated α that ranged from 0.843 to 0.958. We then performed a one-way ANOVA on the aggregated mean SE of all three activity situations across all five case contexts, pre-course and post-course (Table 4). There were significant differences between SVI and all other cases at the beginning of the course, yet no such difference was seen at the end of the course. We then conducted a one-way ANOVA to compare the magnitude of the change between pre and post-measures (post minus pre; calculated across all activity contexts) between the five disability cases. There were significant differences between the five disability cases (F=23.55, p<0.001, η2p=0.122). Using post hoc analyses with Bonferroni adjustments significant differences between SVI and all other disability cases were found (p<.001). Nevertheless, post-hoc measured power was insufficient (0.52), based on an effect size of 0.1, two measurement points in time and five cases.

Table 4. One-Way Analysis of Mean Scores for all Activity Situations across all Case Contexts at Pre- and Post-Course

Time	Activity	Mean	SD	Lower	Upper	F	*p*	ES η^2_p
Pre-Course	SVI	2.83	1.07	2.67	2.99	14.65	0.001	0.26
	CPD	3.37	1.08	3.2	3.53			
	ASD	3.33	1.09	3.16	3.49			
	IDD	3.42	0.92	3.29	3.56			
	SCI	3.37	1.15	3.19	3.54			
Post-Course	SVI	3.59	1	3.44	3.74	1.89	NS	0.04
	CPD	3.6	0.98	3.45	3.74			
	ASD	3.44	0.98	3.3	3.59			
	IDD	3.59	1.01	3.44	3.74			
	SCI	3.62	1.01	3.47	3.77			

Note: SVI = severe visual impairment; CPD = cerebral palsy diplegia; ASD = autism spectrum disorder; IDD = intellectual and developmental disability; SCI = spinal cord injury; NS = non-significant

The association between the teacher's SE and attitudes' baseline and change scores

As seen in Table 5, statistically significant negative correlations (ranging from -.513 to -.684) were obtained for SE in all three activity situations, as well as attitudes towards inclusion in all five case contexts. In other words, greater score changes were seen post-course for respondents with lower pre-course scores (i.e., participants with lower SE and attitudes at the beginning of the course achieved a greater gain from the course for all case contexts). The strongest associations were seen for SE for SVI and SCI, and for attitudes towards inclusion for the CPD and SCI case contexts.

Table 5. Pearson correlations (r) between the teachers' self-efficacy and attitudes at the beginning of the course and the difference gained between the beginning and the end of the course

Case/Task	SVI	CPD	SCI	ASD	IDD
Ball-skills SE	-.635***	-.519***	-.674***	-.642***	-.594***
Fitness SE	-.684***	-.539***	-.594***	-.570***	-.567***
Ball-game SE	-.631***	-.587***	-.648***	-.607***	-.590***
Attitude	-.556***	-.636***	-.612***	-.563***	-.513***

***=p<.001; SVI = severe visual impairment; CPD = cerebral palsy diplegia; ASD = autism spectrum disorder; IDD = intellectual and developmental disability; SCI= spinal cord injury; SE = self-efficacy

Discussion

This study examined the differences observed following an online course in attitudes and SE of pre-service PE teachers across three activity situations and five case contexts. Such studies are greatly lacking in the literature, and are often limited in scope and size. For example, Roldan & Reina (2021) conducted a study with 38 participants, starting a few weeks after the COVID-19 outbreak, subject to the immediate transition to distance learning in higher education institutions. The authors reported that the results of the SE perceptions of the participants did not differ from those of a group of students who had participated in a similar face-to-face course during the previous term. While the current study was conducted in relation to only an online course (rather than compared to a face-to-face one), its large sample size (n=171) enabled us to address more complex content-related questions, in addition to reporting the outcome of the intervention. The following sections discuss each of the study's research questions and hypotheses.

Differences regarding various disability contexts

The purpose of this study was not to compare the outcomes of an online course with those of a similar face-to-face course. Yet, using an abridged SE and attitudes scale, we examined how online course participation was related to differences in pre-service PE teachers' attitudes and SE. Partially supporting our expectations, statistically significant differences with medium effect sizes were found in the SVI case context and significant differences with small effect sizes were found in the IDD and SCI case contexts, in all activity situations, as well as in the CPD for the game participation activity situation. However, when accounting for change score sizes we found that the differences observed were underpowered. No significant differences were found following the course in any activity situations regarding the ASD case context.

The magnitude of change seen in this study regarding SE in relation to IDD and SCI was smaller than those obtained in other programs, online (Kwon & Block, 2017; Roldan & Reina, 2021) or face-to-face (Taliaferro et al., 2015; Wang et al., 2020). Notably, in this study post-program scores were below 4.0 (out of 5), while in most other studies they exceeded this benchmark. These differences in the magnitude of SE change may reflect inadequate course content, yet it could also reflect differences in variables, such as being in an earlier or later study year (Hutzler et al., 2005), or differences in research tools and scoring methods. Further studies on comparisons between the original SE-PETE-D and the abridged version used in this study could be beneficial, for ruling out instrument-related differences. Regarding attitudes toward the placement of children with disabilities in regular schools, based on our findings significant changes with small (ASD and IDD) to medium (SVI) effect sizes were observed. Only in SVI and IDD were statistically significant changes observed in both SE and attitudes, however, with insufficient power, when accounting for change scores. In accordance with the model of domains of attributes influencing teachers' attitudes and SE (Hutzler et al., 2019) this may reflect that during the course SVI and IDD disability attributes were more likely to adapt than others and facilitate a difference in teachers' attitudes and SE and are thereby also likely to influence their behavior toward including them in PE. Further studies with adequately powered samples and comparative circumstances should be conducted to support this potential outcome.

SE –Differences Between Activity Situations

Previous reviews (e.g., Hutzler et al., 2019; Rekaa et al., 2019; Wilhelmsen & Sørensen, 2017) have mostly referred to differences in SE in relation to the criteria and perspectives of teachers and students, or governmental policies, overlooking the meaning of the type of activity in which the SE was assessed. As a preliminary procedure prior to addressing the outcomes, we evaluated the internal consistency of the aggregated outcomes (across disability cases) for each activity situation. Good to very good internal consistencies were seen in the current study for each activity situation in the pre- and post-course measurements, respectively. When conducting further analysis on activity situations for the pre-course and post-course data and found statistically significant with large effect sizes at each point in time with a clear structure, whereby the greatest SE was seen in ball skill teaching, while the lowest SE was seen in game participation. These findings should be addressed when designing PE curricula and programs. Indeed, with few exceptions (e.g., Kalyvas & Reid, 2003; Place & Hodge, 2001), research on experimental studies regarding inclusion in ball game activity is scarce, compared to literature on teaching PE-related skills, and is often associated with personal confusion (e.g., Goodwin & Watkinson, 2000) and limited social interaction (Block & Obrusnikova, 2007). Sports game activity requires complex physical and social interaction, where the adaptations facilitating the inclusion of students with disabilities must be conducted very carefully to avoid the frustration of either those with or without disabilities, or both of them. Therefore, teacher training programs for

inclusion could benefit from such measures as a supplementary guide as in the Incluye-T program (Reina et al., 2019), and real-life examples associated with an intensive discourse (Hutzler & Bar-Eli, 1993).

SE – Differences Between Case Contexts

Based on previous studies it has been suggested that the type of disability could have influenced PE teachers' attitudes towards inclusion (Hutzler, et al., 2019). For example, in a cross-national study of 371 PETE students from the United Kingdom, Belgium, Portugal, and Denmark, the participants presented less positive attitudes towards the inclusion of children with physical disabilities than with learning disabilities (Downs & Williams, 1994). We, therefore, hypothesized that differences will be observed between SE regarding the inclusion of children with different types of disabilities in PE classes. In accordance with this hypothesis, statistically significant differences were found in SE in favor of the inclusion of children with SVI compared to the other disability cases included in this study at the onset of the course. However, this difference vanished at the end of the course. Nevertheless, significantly larger change scores were observed regarding SVI. While this finding is underpowered, it appears that during the course the magnitude of SE change observed in this study was larger regarding the inclusion of children with SVI compared to the other four disabilities and study participants became more confident regarding the inclusion of these children in PE. This seems important, as children with SVI experience significant barriers during PE classes (Lieberman et al., 2002), and are even subjected to bullying (Ball et al., 2022), resulting in marginality, frustration, and inadequacy (Haegele & Zhu, 2017). Therefore, the difference seen following the online course addressed in this study is likely to result in more positive experiences for children with SVI when participating in PE lessons in regular educational frameworks.

Association between SE and Attitudes at the beginning of the course and the difference gained between the beginning and the end of the course

In relation to our fourth and final research question and hypothesis, we expected to see a decreasing negative association in the respondents' SE and attitudes before and after the course. In other words, in accordance with the concept of diminishing returns (Trostel, 2005), we expected the respondents with lower scores at the beginning of the online course to most benefit from it across the variables assessed in this study. As seen in the findings (Table 5), all correlations between SE and attitudes at the beginning and the difference gained throughout the course were significant, negative, and with medium-to-large magnitudes (Schober et al., 2018), thereby supporting our hypothesis. This finding can be supported with findings reported in adult education programs, for example regarding attitudes towards classroom technology (Griffiths, 2015). Furthermore, in a sample of 839 English school teachers, researchers reported that "as pressure from imposed curriculum changes increased, the differential advantage offered by higher SE diminished" (Putwain & von der Embse, 2019; p. 59).

The controversy between the positive social value associated with inclusion and the stress that is imposed on PE teachers when including such children, has been modeled by Hutzler et al. (2005) in relation to the Theory of Stress Appraisal and Coping (Lazarus & Folkman, 1984). Based on their model, an imbalance between environmental inclusion demands and perceived personal resources may increase stress and reduce coping performance, SE, and attitudes toward inclusion. Future studies should monitor the PE teachers' SE and attitudes towards inclusion throughout the course – in addition to the pre-course and post-course assessment conducted in this study – with an emphasis on stress and combined with the provision of immediate feedback and support as needed.

Limitations

This study offers an important contribution to the literature regarding the differences observed regarding disability and activity contests following an online course, yet it is not without limitations. First, the spinal cord case has not been specifically identified as having paraplegia or quadriplegia. This may have caused some ambiguity among respondents in interpreting implications for physical education. Second, the 43.9% attrition rate from pre-course to post-course (or vice versa) respondence rates must be addressed. Yet this figure is common in prospective surveys for example in the health professions, where attrition rates have shown to be typically less than 50% (Cho et al., 2013). It is likely that APA students experience similar attrition rates. Moreover, younger people (as in this study) are known to be less responsive than older ones (Powers et al., 2015). Furthermore, the response rate in the current study was based on more than 80% respondents in both time points, with a substantial number of respondents in total. Finally, the lack of a follow-up measurement after the end of the intervention to check the retention of our findings is another limitation. Future studies should attempt to include measurements of retention as well as the influence of SE and attitudes on the educational process.

Conclusion

In this study, the changes across a one-semester (14 sessions long) online course regarding SE and attitudes of PETE students toward including children with disability in mainstream PE are described with particular emphasis on situational and disability contexts. The outcomes of this study indicate that such courses may have different results regarding SE and attitudes across activity contexts and toward specific disability case descriptions. Furthermore, it has been uncovered that this course was especially important for PETE students with lower SE and less supportive attitudes. Such information is necessary to better design and implement future courses aimed toward the inclusion of students with disability in PE.

Perspectives

As PETE students are likely to present low SE and negative attitudes towards the inclusion of children with SVI in PE lessons, compared to other physical or cognitive disabilities, specific disabilities should be addressed in the online course and in related experiential practices, such as the Paralympic Sports Day Workshop (McKay et al., 2015), that offers a valuable addition to knowledge-based online or face-to-face courses. As differences were also seen among the pre-service PE teachers' SE and attitudes towards inclusion depending on the activity situation, this should also be addressed in the outline and design of the course program (perhaps with greater focus being placed on game participation than on basic sport skills). Finally, the knowledge obtained during the online course should be reinforced through simulation activities, that could be achieved through specific workshops (Reina et al., 2011). Future studies are recommended with even larger sample sizes to allow adequately powered conclusions across activity situations and disability cases.

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