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# Enhancing attitudes and self-efficacy toward inclusive teaching in physical education pre-service teachers: Results of a quasi-experimental study in physical education teacher education

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As many teachers feel overwhelmed by teaching inclusively, teacher education programs have to find ways to prepare them for this future challenge. Due to particular conditions, physical education (PE) teachers might be a particular target group in this context. With regard to the state of research, there is a need to identify inputs or learning situations that might improve the best physical education teachers' competencies and underlying cognitive and affective-motivational aspects, such as attitudes, self-efficacy, or stress perception, to empower physical education teachers for teaching physical education inclusively. Practical experiences seem to be a key aspect in this context. Therefore, we conducted a quantitative evaluated quasi-experimental intervention study with physical education pre-service teachers to test different forms of promoting inclusion competencies and their underlying cognitive and affective-motivational constructs. Intervention group 1 (IG 1) followed an information-based seminar, whereas intervention group 2 (IG 2) was also taught theoretical units in combination with practical lessons in the gym that were prepared and conducted by the pre-service teachers themselves. The control group (CG) did not receive any specific information or practical experiences on inclusively teaching physical education. We first hypothesized that both intervention groups (IG 1 and IG 2), in contrast to the control group, would significantly improve their attitudes toward inclusion and the self-efficacy to teach inclusively, and would decrease their perceived stress related to teaching physical education inclusively (hypothesis 1). Second, we hypothesized that participants of intervention group 2 would have a significantly stronger increase in positive attitudes toward inclusion, a stronger increase in self-efficacy, and a greater decrease in the level of perceived stress related to teaching physical education

inclusively than participants of intervention group 1 (hypothesis 2). Based on ANCOVA analysis, we found significant results for some subscales of the attitudes, but no significant results for stress perception and self-efficacy. In total, the teaching strategy in intervention group 2 seemed to work best in enhancing physical education pre-service teachers' inclusion competencies.

#### KEYWORDS

**inclusive education, physical education, pre-service teachers, intervention study, teacher education**

## Introduction

To date, inclusion and inclusive education have been implemented in schools in numerous countries (Tant and Watelain, 2016; Harant, 2017). Based on the United Nations Convention on the Rights of Persons with Disabilities, which was ratified in Germany in 2009, inclusive schooling of all children is mandatory. In the context of education, inclusion can be defined as the “means of increasing participation in learning by all students so that their educational needs can be met” (Qi and Ha, 2012, p. 258). In contrast to this all-encompassing understanding of inclusion, schools and educational reforms often only focus on the aspect of inclusion which denotes the integration of pupils with disabilities into regular schools. This has subsequently led to the directive that “persons with disabilities can access an inclusive, quality and free primary education and secondary education on an equal basis with others in the communities in which they live” (United Nations [UN], 2014 Article 24–Education, 2.b).

While discussing inclusion and inclusive education in schools, the special role of teachers and their competencies has to be considered. Following Blömeke et al. (2015), we understand competencies as complex ability constructs that are context-specific and measurable either by cognitive and affective-motivational aspects (dispositional view) and are finally observable in performance (behavioral view). Conceptually, competencies can be modeled as a continuum. They are learnable and can thus be improved, e.g., via continuing education or teacher education programs at university. However, to successfully implement inclusion at school, teachers not only need adequate (continuing) education and sufficient support (e.g., special equipment) but also positive attitudes toward inclusion (Frankel et al., 2010) as well as self-efficacy (Block et al., 2013). With respect to the success of inclusion, to a large extent it depends on the “willingness of teachers to cater to the pupils with disability in their class” (Gilor and Katz, 2017, p. 294). Studies have shown that a positive attitude toward inclusion has a positive effect on teaching and the integration of students with special educational needs in regular

classes (Avramidis and Norwich, 2002; Sharma et al., 2008; De Boer et al., 2011; Killoran et al., 2014; Lüke and Grosche, 2018b). However, the school subject and the form of disability affects teachers' attitudes toward inclusion: physical education (PE) teachers are less favorable toward including children with orthopedic, visual or mental impairment in their PE classes, whereas they are ambivalent about including children with emotional and behavioral difficulties (Hutzler et al., 2019). As attitudes toward inclusion have to be focused on a specific school subject, we are focusing our paper on PE (pre-service) teachers. In this context, studies have shown that even if PE (pre-service) teachers have positive attitudes toward inclusion, they do not feel well prepared to teach inclusively (Reuker et al., 2016 for Germany; in the international context: Morley et al., 2005; O'Brien et al., 2009), and they feel hardly any self-efficacy in teaching children with emotional and behavioral difficulties or mental, visual, or hearing impairment (Leineweber and Thomas, 2017). Fejgin et al. (2005) even point out a positive relationship between the number of students with special educational needs in a PE class with the PE teachers' experienced burnout.

Thus, we need to identify inputs or learning situations that might improve the best PE teachers' competencies and underlying cognitive and affective-motivational aspects, such as attitudes, self-efficacy, or stress perception, to empower PE teachers for teaching PE inclusively. “Teaching is currently seen as an overwhelming profession and it is important to bring beginning teachers to the place where they feel they are capable and will be more emotionally equipped to take on the stressors of the classroom” or in our context, of the gym (Specht and Metsala, 2018, p. 69). Furthermore, pre-service teacher education programs may be the optimal time to address future teachers' attitudes and concerns about inclusive education, trying to change them in a positive way (Sharma et al., 2006; Specht and Metsala, 2018). In this context, Lautenbach and Heyder (2019) were able to identify 23 studies in general teacher education that attempted to promote pre-service teachers' attitudes and self-efficacy, using different teaching strategies (purely theoretically driven, a combination of theoretical inputs and practical experiences or purely practical experiences), and evaluated the impact of these

teaching strategies in pre-and post-intervention designs. The study results were inconsistent, showing mostly positive changes in pre-service teachers' attitudes, no changes or seldom negative changes. However, the biggest limitation of these previous studies is the absence of control groups in the study design. Thus, it is difficult to link changes to the educational input (Lautenbach and Heyder, 2019).

Although, we could suggest that particular inputs in teacher education seminars could have a positive impact on attitudes toward inclusion as well as on self-efficacy, there is still a need to examine the extent of changes in different seminar designs, and with a special focus on PE as a particular school subject compared to other subjects. Teaching PE takes place under particular conditions: (1) a large space, where many students move around in different ways and places at the same time, which requires a particular kind of classroom or better gym management to guarantee corporal and emotional safety of all students (e.g., Grube et al., 2018). (2) Particular requirements regarding teachers' own physical conditions, like own sport motor competencies or volume of the voice (e.g., Brouwers et al., 2011). (3) The openness of learning situations in PE offers students more possibilities of displaying and negotiating peer relationships. In this context, heterogeneity might result in exclusion and mobbing processes if PE teachers are unable to handle, in an appropriate way, differences in sport motor competencies or in social popularity within their students (e.g., Grimminger, 2013, 2014). (4) PE is a field where the ability or disability of moving in the right way or having the societally accepted body shape is constantly displayed and that might be experienced as a humiliating context if PE teachers are not sensitive toward embarrassing situations (Kerner et al., 2018). This is mostly the case if PE teachers follow traditional sport approaches where norms of performances and the "right" body are anchored. These traditional norms might be a barrier for teaching PE inclusively (Giese and Ruin, 2018). (5) Another barrier for including students with special educational needs in PE is the fear for pupils' safety and the possible negative impact on peers (e.g., Ko and Boswell, 2013). Thus, PE seems to be a particular school subject in the context of inclusion and PE teacher education needs to be tailored to these particular aspects.

In particular, in recent years, there is an increase in the number of intervention studies to enhance PE (pre-service) teachers' attitudes, self-efficacy, or competencies in teaching PE inclusively. The studies vary in length, formats of teaching courses (only theoretically, combination of theory and practice in different contexts) as well as in the study design (implementation of a control group or not). In this context, Barber's case study (2018) is one of the rare qualitative studies. The author took up the challenge of traditional sport approaches and with it linked norms and values of (dis-)ability, and developed a "program modification in pre-service PE teacher designed to interrupt misconceptions and to construct new understandings of "dis"ability, to assist teacher education

students in beginning to develop a philosophy of full inclusion" (p. 520). The intervention consisted of a one-day visit to an "Abilities Center" where able-bodied and disabled individuals interacted with each other. As part of the visit, the pre-service teachers participated in para sport sessions. The impact of this visit on the PE pre-service teachers' attitudes toward inclusion and their perception of (dis-)ability was examined with pre- and post-focus groups, videography of student reflections, and individual interviews. Barber (2018) noted relatively minor changes in the pre-service teachers' attitudes. However, changes in the perceptions of (dis-)ability could be identified. The participants became more open to understanding the potential of the variety of movement experiences for inclusion. Nevertheless, this change was not reflected in their approach to lesson planning. All the other studies are quantitative intervention studies, like Taliaferro and Harris (2014) who examined the impact of a one-day workshop on PE teachers' self-efficacy to include students with autism spectrum disorder. The changes in the intervention group were not significant when compared to the control group. Additionally, a non-significant impact on judgments about inclusion was shown by a two-day workshop with PE teachers (Haegle et al., 2018; no control group was implemented). Therefore, we could conclude that the length of an intervention might be crucial. Subsequently, Taliaferro et al. (2015) examined the effect of participation in one of two 15-week adapted physical education courses, with a nine-week experience practicum, on pre-service teachers' self-efficacy toward the inclusion of students with special educational needs. The results showed a significant increase in the pre-service teachers' self-efficacy across all disability categories. Therefore, these results implicated the importance of a certain length of intervention as well as the relevance of practical experiences. However, as the researchers did not enroll a control group in their study, the precise effect of the intervention may be unclear. Thus, Reina et al. (2019) ran a pre- and post-test quasi-experimental intervention study with PE teachers with an intervention group, who followed the so-called *Incluye-T* training program, and with a control group who did not participate in this special program. Each of the six face-to-face sessions (lasting for 3 h) combined a theoretical component with a practical component, when PE teachers were asked to modify activities, equipment, and instruction for students with special educational needs, via the use of simulations. Physical disabilities, intellectual disabilities, and visual impairment were addressed. The researchers examined the effect of this special training program on PE teachers' self-efficacy and could note significant improvements for the participants in the intervention group compared to the control group. The development was not affected by school type or gender. In their follow-up study, Reina et al. (2021) could even prove the impact of a teacher designed and implemented disability awareness program on the attitudes of students toward inclusion. After following the *Incluye-T*

training program, the PE teachers developed and implemented their own disability awareness activities in their regular PE lessons. The results showed that combined activities that focus on several disabilities/impairments had the highest impact on students' disability awareness.

As pre-service PE teachers do not yet have the same practical experiences as PE teachers who participate in an in-service training, the design and content of a training program for pre-service PE teachers should be particularly tailored. Furthermore, PE in higher education is a subject for which almost half of the teaching courses are practical sport courses in which pre-service teachers develop mostly their own sport performance as well as their competencies to teach a certain sport discipline (Erhorn et al., 2020). Thus, Zach et al. (2012) concluded that extending field experiences as well as movement and sport classes that emphasize the practice of teaching methods improve PE pre-service teachers' self-efficacy. Hopkins et al. (2018) also underlined the potential of fieldwork experiences for the development of a teacher identity. Thus, Lautenbach et al. (2020) implemented a quasi-experimental intervention study with PE pre-service teachers to test the effect of a theoretically based seminar in comparison to a theoretically based seminar with practical experiences, i.e., participation in inclusive sport groups, in comparison to a control group with no particular input about inclusion. The researchers aimed the enhancement of the pre-service teachers' attitudes and self-efficacy toward inclusion, and the reduction of stress perception of teaching inclusively. Although the results underlined the advantage of the combined theory-practical seminar, participating in an inclusive sport group might not be enough with respect to PE pre-service teachers' prospective jobs that will require teaching inclusively.

Finally, we can conclude that previous intervention studies on the enhancement of (pre-service) PE teachers' attitudes, self-efficacy, and teaching competencies in an inclusive setting underline the importance of the intervention length as well as the relevance of the combination of theoretical inputs with practical experiences that should be pedagogically accompanied and reflected upon. Nevertheless, we do not know yet which kind of practical experience might be successful in pre-service PE teacher education. Reina et al. (2019) showed the impact of combining theory with teaching practices for the inclusion of students with physical disabilities, intellectual disabilities, or visual impairment for PE teachers. However, is this teaching strategy also successful for pre-service PE teachers with less teaching experience? And finally, is the simulation approach in the practical units the only way to translate theory into practice?

Following these principal questions, we conducted a quasi-experimental intervention study with two different intervention groups (IG 1 and IG 2) and a control group (CG). We wanted to examine the following research question: Which form of intervention might have a greater impact on attitudes toward inclusion, on stress perception, and on the self-efficacy to teach PE inclusively among PE pre-service teachers? Therefore,

the intervention groups underwent two different teaching programs for the enhancement of important influencing factors, like attitudes toward inclusion and self-efficacy in teaching inclusively, as well as for a reduction in perceived stress regarding an inclusive physical education class. Whereas IG 1 followed an information-based seminar, including theoretical units on how to plan PE lessons in an inclusive PE context, IG 2 was also taught these theoretical units and additionally put the theoretical aspects to the test in practical lessons in the gym. The PE pre-service teachers were responsible for these practical lessons by planning and conducting the lessons with their fellow pre-service teachers. Their planning was guided by current recommendations for designing inclusive physical education classes (e.g., Tiemann, 2015; Giese and Weigelt, 2017), taking into account the type of impairment (e.g., learning disabilities, emotional and behavioral difficulties, physical impairment, chronic diseases and intellectual impairment) that should be specifically addressed in each lesson. Like in the study of Reina et al. (2019), the pre-service teachers should find pedagogical adaptations or modifications, e.g., in content, rules or material, with regard to the particular impairment. However, in contrast to Reina et al. (2019), their fellow pre-service teachers were not asked to simulate the impairment for various reasons: (1) Not all types of impairment can be simulated, or the simulation might possibly result in a display of stereotypes; e.g., how a child with emotional and behavioral difficulties might behave in PE in the pre-service teachers' view. Finally, stereotypes should not be actively initiated; instead, they should be critically reflected upon to sensitize pre-service teachers to their own stereotypes in relation to teaching behavior (Macrae et al., 1994). (2) The aim of the intervention study was not to help pre-service PE teachers experience what it is like to have a disability; that is the aim of the disability simulation approach (McGowan, 1999). The aim of the intervention study was to sensitize pre-service PE teachers to pedagogical strategies for teaching PE inclusively. (3) The effect of the disability simulation approach on attitudes toward inclusion is ambivalent; it could have also a negative impact as participants without disabilities could experience the simulation as overwhelming due to missing coping strategies (e.g., Flower et al., 2007). The lessons planned and conducted by the pre-service teachers were reflected upon afterward by all seminar participants and were also commented upon by the university lecturer. The aim of this teaching scenario was to give pre-service teachers mastery experiences, as they seem to be crucial predictors of teachers' self-efficacy regarding inclusive teaching (Wilson et al., 2020). The control group was only theoretically taught how to plan a physical education lesson without specific information about inclusive pedagogical concepts.

The study was theoretically based on the theory of planned behavior (Ajzen, 1991) and the self-efficacy theory of Bandura (1977) to link attitudes with behavior. Thus, it could be argued that attitudes toward inclusion can theoretically as well as empirically be linked to teaching

behavior (Yeo et al., 2014). However, teachers' attitudes toward inclusion depend on different contextual variables, like gender, age, length of professional experience, amount and quality of teachers' acquaintance with persons with disabilities, amount and quality of teachers' academic training and practicum, the degree of perceived self-efficacy or competence, the impact of children's disability attributes, and the school environment including type or level of school (e.g., Specht and Metsala, 2018; Hutzler et al., 2019). In the theory of planned behavior (Ajzen, 1991), self-efficacy is one of the factors besides personal external factors, attitudes and subjective norms that influences the formation of a behavior intention that might lead to a concrete behavior. As Savolainen et al. (2020) have shown in a longitudinal cross-lagged study that self-efficacy influences attitudes toward inclusion, the enhancement of self-efficacy of (pre-service) teachers seems to be crucial. Specht and Metsala (2018) also strengthen that especially in pre-service teacher programs, positive experiences in inclusive educational settings are important for the development of self-efficacy. Bandura (1977) hypothesized that self-efficacy determines whether individuals act, how much effort they will expend and how long they will continue acting in the face of obstacles and failures. According to Bandura (1977), self-efficacy makes a difference in how people think, feel and act. Teachers' self-efficacy is a domain-specific aspect (in contrast to general self-efficacy) and can be defined as "the teacher's belief in her or his ability to organize and execute the courses of action required to successfully accomplish a specific task in a particular context" (Tschannen-Moran et al., 1998, p. 233). Following Bandura (1977), self-efficacy can be increased by four sources: (1) mastery experiences or personal experiences (e.g., performance exposure), (2) vicarious experiences (e.g., observing a model performing a task that is within one's own abilities), (3) social persuasion (e.g., verbal messages or social encouragement) and (4) physiological and/or affective responses (e.g., state of anxiety). In this context, Martins et al. (2015) showed that pre-service teachers with high self-efficacy highlight during a practicum, for example, planning and teaching practice as a mastery experience, lesson observation as a vicarious experience and post-lesson discussions as persuasion, whereas pre-service teachers with low self-efficacy might associate the same learning situations with negative emotions. Thus, self-efficacy can be a resource to deal with stress (Lazarus and Folkman, 1984). Stress occurs if the subjective appraisal of the relevance of a stressor and the appraisal of the individual's perceived resources to deal with this stressor lead to the conclusion that the resources are not enough to handle the stressor. Hutzler et al. (2005) have suggested that self-efficacy influences attitudes toward inclusion moderated by stress perception. Increasing self-efficacy could therefore reduce perceived stress, enhance attitudes toward inclusive classes and teaching inclusively and, finally, improve concrete teaching behavior in inclusive classes.

With regard to the previous intervention studies in PE teacher education, we wanted to examine in our quasi-experimental study which form of intervention might have a bigger impact on attitudes toward inclusion, on stress-perception and on the self-efficacy to teach inclusively among PE pre-service teachers. Based on the results of previous intervention studies, we first hypothesized that both intervention groups (IG 1 and IG 2), in contrast to the control group, would significantly improve their attitudes toward inclusion and the self-efficacy to teach inclusively, and would decrease their perceived stress related to teaching PE inclusively (hypothesis 1). Second, we hypothesized that participants of IG 2 would have a significantly stronger increase in positive attitudes toward inclusion, a stronger increase in self-efficacy, and a stronger decrease in the level of perceived stress related to teaching PE inclusively than participants of IG 1 (hypothesis 2).

## Materials and methods

### Participants

In total, 86 PE pre-service teachers (mean age = 25.17;  $SD = 2.24$ ; 34 females) from two universities were enrolled in the study, with IG 1 and CG at one university (taught by two different teachers) and IG 2 at another university. The groups did not differ in gender distribution, age and practical experience with inclusion at school as well as outside school (e.g., volunteer service), meaning previous contact or experiences with persons with disabilities (only operationalized as "yes or no" and not measured with respect to intensity or quality of experience). They differed, however, in their theoretical experiences with the topic of inclusion after counting the number of seminars previously attended that dealt with the topic of inclusion. IG 2 had significantly fewer pre-service teachers without previous theoretical experience than the other groups. Table 1 gives an overview of the study population at pre-measurement.

Participant recruitment was carried out through surveys in compulsory master's seminars at the two universities. Allocation

TABLE 1 Overview of the study population at pre-measurement.

	IG 1 ( <i>n</i> = 49)	IG 2 ( <i>n</i> = 17)	CG ( <i>n</i> = 20)
Gender	20 females* 27 males*	9 females 7 males	5 females 12 males
Age	mean age = 25.49 ( <i>SD</i> = 2.23)	mean age = 24.41 ( <i>SD</i> = 1.91)	mean age = 25.00 ( <i>SD</i> = 2.50)

\* Two persons did not indicate their gender.

to the groups was performed by pre-service teachers' selection of the respective seminar. Participation in the study was voluntary. The pre-service teachers were told that non-participation had no negative consequences for them and that they could quit the study at any time. The study protocol was approved by the ethics committee of TU Dortmund University (approval number: 2017 3).

## Data collection

To test the explicit attitudes toward inclusion, we used two questionnaires to measure attitudes on a macrosystem level and on a classroom level. For the macrosystem level, we implemented the questionnaire on "Attitudes toward an Inclusive School System" (Lüke and Grosche, 2018a; 5-point Likert scale). In accordance with the definition of attitudes as constructs that consist of affective, cognitive and behavior-related components, this questionnaire includes three subscales: "emotion" (five items; example item: "It would be great if all children could be taught in an inclusive school system";  $\alpha = 0.69$ ), "behavioral intentions" (five items; example item: "I would be willing to participate actively in the development of an inclusive school system";  $\alpha = 0.69$ ) and "cognition" (10 items; example item: "I think an inclusive school system wouldn't be able to get all children to their best individual performances";  $\alpha = 0.83$ ). To measure attitudes toward inclusion at the classroom level, we included the "Questionnaire on Attitudes toward Inclusion for Teachers" (Seifried and Heyl, 2016; 6-point Likert scale) with its three subscales: "promotion of academic competencies" (six items; example item: "Children with special needs will be equally supported in both an inclusive class and in a special needs class";  $\alpha = 0.85$ ), "willingness to teach inclusively" (five items; example item: "I can imagine teaching an inclusive class next term";  $\alpha = 0.71$ ) and "social inclusion" (four items; example item: "Children with special needs will be treated well by other children in an inclusive class";  $\alpha = 0.51$ ;  $H = 0.87$ ). The level of subjectively perceived stress when imagining teaching PE inclusively was measured using the validated Primary Appraisal Secondary Appraisal Scale (PASA) (Gaab, 2009; 6-point Likert scale). The PASA consists of four subscales assessing "challenge" (four items; example item: "The situation is a challenge for me";  $\alpha = 0.42$ ;  $H = 0.90$ ) and "threat" (four items; example item: "This situation scares me";  $\alpha = 0.73$ ), which forms the primary appraisal scale ( $\alpha = 0.44$ ;  $H = 0.79$ ). The secondary appraisal scale ( $\alpha = 0.80$ ) consists of the subscale "self-concept of own competencies" (four items; example item: "I know what I have to do in this situation";  $\alpha = 0.52$ ;  $H = 0.79$ ) and the subscale "control expectancy" (four items; example item: "I can control a lot myself of what I can do in this situation";  $\alpha = 0.74$ ). A stress index as an indicator for stress perception can be calculated by subtracting the secondary appraisal from the primary appraisal mean scores (Gaab, 2009).

A higher stress index indicates a higher subjective level of stress. Although the PASA questionnaire examines aspects of self-efficacy in the particular context of teaching PE inclusively, we measured the general teacher-related self-efficacy by the Teacher Self-Efficacy Scale (Schwarzer and Jerusalem, 1999; 4-point Likert scale). This scale consists of 10 items [example item: "I am convinced that I can develop creative ways to cope with system constraints (such as budget cuts and other administrative problems) and continue to teach well";  $\alpha = 0.77$ ]. As Cronbach's alpha values of some scales might indicate a low consistency ( $\alpha < 0.60$ ), we calculated the Coefficient  $H$  for the maximal reliability of these scales. Coefficient  $H$  tends to provide the highest estimates of internal consistency. It is not affected by the addition of poor items because its intended use is for optimally weighted scales. In optimally weighted scales, items are differentially weighted, so an unrelated item does not affect reliability (McNeish, 2018). The calculated Coefficient  $H$  for all the scales with a low Cronbach's alpha value were good. Therefore, we can also presume the reliability of these scales.

The time between the pre- and post-questionnaire was fifteen weeks, and it was used for a specific seminar structure (90-min sessions per week). This was designed to deal specifically with the topic of inclusion in the intervention groups, while the control group had no explicit units on the topic. The two intervention groups differed in the special design of the seminar. While IG 1 dealt with the topic only on a theoretical level, IG 2 focused on a combination of practical and theoretical examinations of inclusive situations as described above.

## Treatment procedures

IG 1 received a theoretical introduction to the Universal Design for Learning (CAST, 2011; Hall et al., 2012) as well as the 6 plus 1 model (Tiemann, 2016) as guidelines for the planning and analyses of inclusive PE classes. The topic of inclusive language was introduced with the example of formulating rules for a soccer play in PE class; this idea was then transferred to the general wording in PE exercises. Furthermore, methods of individual promotion were theoretically discussed.

IG 2 first got a theoretical introduction to basic terms and teaching concepts of PE with respect to inclusion (Kullmann et al., 2014; Tiemann, 2015, 2016), heterogeneity and individual promotion in physical education (Fediuk, 2008), reflective co-education (Gieß-Stüber, 2012; Kastrup and Kleindienst-Cachay, 2016) and intercultural competence (Grimminger-Seidensticker and Möhwald, 2017). Hereby, we conceptually understood inclusion as the creation of a positive and meaningful learning environment for all students, not only for those with special educational needs (Overton et al., 2017). In the second part of the master's seminar, a practical examination was the focus. The pre-service teachers were asked to plan and implement

with their fellow pre-service teachers teaching sequences in which students with and without specific educational needs were taught inclusively. The teaching sequences were reflected upon after implementation. Different specific educational needs were addressed as examples: learning disabilities, emotional and behavioral difficulties, physical impairment, chronic diseases, and intellectual impairment. In the five practical units of the seminar, the respective procedure was as follows: pre-service teachers were first informed about the important characteristics of the impairment – its genesis and distribution and the resultant experience and behavior of the affected adolescents. Subsequently, they demonstrated in a sport unit with their peers a pedagogical inclusive handling of the impairment (without simulating the addressed impairment). The aim of this procedure was to give mastery experiences to the pre-service teachers who were responsible for the lesson. In the subsequent reflection phase, a discussion was held about which teaching adaptations specific to the impairment were perceived by the participating pre-service teachers and how they were experienced and evaluated by them. In addition, pre-service teachers disclosed their ideas and presented them for discussion. Finally, the demonstrated sport units were classified according to the theoretical models of inclusive physical education. The aim of this step was to initiate social persuasion processes and to give other pre-service teachers, who were not responsible for the lesson, vicarious experiences.

The control group also discussed methods for the individual promotion of children's competencies, but not in detail, and focused on the steps for planning and analyzing PE lessons in general.

## Statistical analyses

In order to determine the effects of the intervention, we selected analysis of variance with repeated measures as the statistical test method (King, 2010). Before testing, we ran *t*-tests and ANOVAs to check for mean differences in the dependent variables “attitudes” (including all subscales used), “stress perception” and “self-efficacy” in the three groups (IG 1, IG 2, CG) at pre-measurement. As already mentioned, teachers' attitudes toward inclusion depend on different contextual variables, like gender, age, length of professional experience, amount and quality of teachers' acquaintance with persons with disabilities, amount and quality of teachers' academic training and practicum, the degree of perceived self-efficacy or competence, the impact of children's disability attributes and the school environment (Hutzler et al., 2019). Thus, we also checked for mean differences in the dependent variables due to gender and school form, as well as for former experiences with inclusion at the theoretical level and in practice at school and outside school. These procedures garnered information about possible covariates in the subsequent ANOVAs with two measurement

points (pre- and post-) for the dependent variables “attitudes” (including all subscales used), “stress perception” and “self-efficacy” within the three groups. We also included a test for equality of variances (Levene's test) of the dependent variables. If this condition was violated, additional non-parametric procedures were carried out to test the development over time (Friedmann test) and the differences between the groups (Kruskal-Wallis test). This concerned the variables “willingness to teach inclusively,” “stress perception” and “self-efficacy.” Since all non-parametric analyses confirmed the results of the variance analyses, only the latter will be presented.

In all ANOVAs, Bonferroni was selected for the confidence interval adjustment to hold the error rate for multiple comparisons to  $\alpha = 0.05$ , and the contrast *repeated* was chosen. Effect sizes, such as partial eta squared and Cohen's *d*, were interpreted following Cohen (1988). All analyses were calculated with IBM SPSS Statistics Version 25 (RRID:SCR\_016479).

## Results

### Descriptive statistics

Table 2 shows that at pre-measurement, significant differences in all the subscales of attitudes already existed within the three groups: “emotion” [ $F(2) = 33.59, p < 0.001; \eta^2 = 0.51$ ]; “behavioral intentions” [ $F(2) = 23.19, p < 0.001; \eta^2 = 0.42$ ]; “cognition” [ $F(2) = 6.79, p = 0.002; \eta^2 = 0.18$ ]; “promotion of academic competencies” [ $F(2) = 9.56, p < 0.001; \eta^2 = 0.24$ ]; “willingness to teach inclusively” [ $F(2) = 10.13, p < 0.001; \eta^2 = 0.25$ ]; “social inclusion” [ $F(2) = 39.38, p < 0.001; \eta^2 = 0.56$ ]. This was true as well as in the level of self-efficacy [ $F(2) = 4.16, p = 0.020; \eta^2 = 0.12$ ]. Specifically, IG 2 significantly differed from IG 1 and CG in all variables except “self-efficacy,” whereas IG 2 differed only from CG. Furthermore, males and females differed in the dependent variable “behavioral intentions” [ $t(62) = 2.05, p = 0.044$ ; Cohen's  $d = 0.53$ ]. Those with previous theoretical experiences with the topic of inclusion differed from those with no previous theoretical experiences with the dependent variables “emotion” [ $t(65) = 2.27, p = 0.027$ ; Cohen's  $d = 0.56$ ], “behavioral intentions” [ $t(65) = 3.06, p = 0.003$ ; Cohen's  $d = 0.76$ ], “promotion of academic competencies” [ $t(62) = 2.55, p = 0.013$ ; Cohen's  $d = 0.65$ ] and “social inclusion” [ $t(64) = 2.10, p = 0.040$ ; Cohen's  $d = 0.53$ ]. Those with practical experiences with inclusion at school differed from those with no practical experiences at school in the dependent variable “cognition” [ $t(20) = 2.64, p = 0.016$ ; Cohen's  $d = 1.18$ ]. Pre-service teachers with practical experiences with inclusion outside school differed from pre-service teachers with no practical experiences with inclusion outside school in the dependent variable “stress perception” [ $t(60) = -2.34, p = 0.022$ ; Cohen's  $d = 0.61$ ].

TABLE 2 Descriptive statistics of the dependent variables at pre-measurement.

Group	N	Mean “emotion” (SD)	Mean “behavioral intentions” (SD)	Mean “cognition” (SD)	Mean “promotion of academic competencies” (SD)	Mean “willingness to teach inclusively” (SD)	Mean “social inclusion” (SD)	Mean “stress perception” (SD)	Mean “self efficacy” (SD)
IG1	35	2.03 (0.37)	2.06 (0.54)	2.01 (0.40)	3.41 (0.54)	3.28 (0.42)	3.64 (0.52)	-0.07 (0.46)	3.14 (0.37)
IG 2	17	3.16 (0.61)	3.05 (0.60)	2.48 (0.72)	4.26 (0.88)	3.91 (0.74)	5.01 (0.81)	-0.051 (1.09)	3.25 (0.26)
CG	15	2.25 (0.52)	1.99 (0.41)	1.88 (0.37)	3.41 (0.74)	3.15 (0.49)	3.48 (0.31)	-0.07 (0.46)	2.91 (0.32)
Males	35	2.30 (0.52)	2.12 (0.71)	2.07 (0.55)	3.56 (0.74)	3.30 (0.60)	3.82 (0.68)	-0.12 (0.70)	3.13 (0.37)
Females	29	2.40 (0.72)	2.47 (0.64)	2.14 (0.52)	3.67 (0.83)	3.53 (0.60)	4.09 (0.94)	-0.43 (0.78)	3.13 (0.34)
Theory yes	36	2.53 (0.77)	2.52 (0.72)	2.10 (0.64)	3.87 (0.84)	3.45 (0.68)	4.15 (0.98)	-0.42 (0.86)	3.16 (0.37)
Theory no	33	2.17 (0.47)	2.03 (0.55)	2.11 (0.41)	3.39 (0.62)	3.33 (0.49)	3.73 (0.58)	-0.14 (0.55)	3.06 (0.33)
Practical school yes	19	2.32 (0.73)	2.04 (0.74)	2.27 (0.32)	3.49 (0.39)	3.45 (0.39)	4.03 (0.87)	0.21 (0.63)	3.06 (0.32)
Practical school no	3	2.67 (0.46)	2.13 (0.50)	1.73 (0.38)	3.50 (0.17)	3.00 (0.20)	3.67 (0.14)	-0.54 (0.81)	3.30 (0.44)
Practical outside school yes	29	2.37 (0.69)	2.34 (0.65)	2.00 (0.62)	3.66 (0.78)	3.50 (0.74)	4.05 (0.86)	-0.52 (0.80)	3.15 (0.35)
Practical outside school no	38	2.36 (0.66)	2.26 (0.72)	2.18 (0.47)	3.62 (0.79)	3.33 (0.46)	3.89 (0.84)	-0.10 (0.64)	3.09 (0.36)

IG 1, intervention group 1; IG 2, intervention group 2, CG, control group; N, sample size; SD, standard deviation. Differences in the number of participants are due to dropout or missing answers in the concerned variables.

## Impact of the intervention

As there were significant mean differences in the dependent variables at pre-measurement, we decided to calculate repeated ANCOVA measures with the pre-test score as the covariate (Jamieson, 2004). Thus, we set gender and previous theoretical or practical experience with inclusion at school or outside school as covariates if there were mean differences in the dependent variables at pre-measurement within the different groups.

Concerning attitudes toward inclusion, we observed for “emotion,” “behavioral intentions” and “social inclusion” neither a significant interaction nor a significant main effect from pre- to post-measurement. However, for “cognition,” “promotion of academic competencies” and “willingness to teach inclusively,” we identified significant effects that will be outlined in the following. For “cognition,” we observed a significant time effect from pre- to post-measurement [ $F(1,29) = 22.03, p < 0.001; \eta^2 = 0.43$ ] as well as a significant group-by-dependent variable interaction effect, mediated by the covariate [ $F(1,29) = 6.09, p = 0.002; \eta^2 = 0.39$ ]. *Post hoc* analysis revealed that the attitude “cognition” increased significantly in all three groups [IG 1  $\text{mean}_{\text{post}} = 2.27, \text{SD}_{\text{post}} = 0.35; t(19) = -3.24, p = 0.004$ ; Cohen’s  $d = 0.78$ ; IG 2  $\text{mean}_{\text{post}} = 3.18, \text{SD}_{\text{post}} = 0.54; t(10) = -5.94, p < 0.001$ ; Cohen’s  $d = 0.98$ ; CG  $\text{mean}_{\text{post}} = 2.25, \text{SD}_{\text{post}} = 0.41; t(3) = -4.98, p = 0.016$ ; Cohen’s  $d = 0.87$ ]. However, by controlling for the mean differences at pre-measurement, the increase in IG 2 was significantly higher than in IG 1 [ $t(29) = -1.95, p = 0.047$ ; Cohen’s  $d = 0.76$ ]. However, there was no significant difference in the increase to CG or between IG 1 and CG. For

“promotion of academic competencies,” we found a significant group-by-time interaction effect [ $F(1,29) = 3.43, p = 0.049; \eta^2 = 0.22$ ]. *Post hoc* analysis showed that the attitude “promotion of academic competencies” increased significantly in IG 2 from pre- to post-measurement ( $\text{mean}_{\text{post}} = 4.46, \text{SD}_{\text{post}} = 0.77$ ) in comparison to IG 1 ( $\text{mean}_{\text{post}} = 3.13, \text{SD}_{\text{post}} = 0.43$ ) and CG ( $\text{mean}_{\text{post}} = 3.08, \text{SD}_{\text{post}} = 0.11$ ), for which no significant changes could be observed [ $F(2) = 8.63, p = 0.001; \eta^2 = 0.37$ ]. For “willingness to teach inclusively,” we noted a significant time effect from pre- to post-measurement [ $F(1,29) = 7.03, p = 0.013; \eta^2 = 0.20$ ] as well as a significant covariate-by-dependent variable interaction effect [ $F(1,29) = 6.24, p = 0.018; \eta^2 = 0.18$ ]. *Post* analysis revealed that only in IG 2 did the attitudes “willingness to teach inclusively” increase significantly from pre- to post-measurement [ $t(9) = -3.55, p = 0.006$ ; Cohen’s  $d = 0.79$ ], and that the increase in IG 2 was significantly higher than in IG 1 [ $F(2) = 7.79, p = 0.002; \eta^2 = 0.33$ ].

Regarding stress perception and self-efficacy, there were no significant interactions or main effects from pre- to post-measurement.

## Discussion

Preparing pre-service teachers for teaching inclusively seems to be one of the most important challenges of teacher education. With the ratification of the United Nations’ Convention on the Rights of Persons with Disabilities, inclusion has become not only a societal desire but a personal right. The



increasing number of children with special needs who are taught in a “regular” school context has led to new challenges for PE teachers in not always ideal structural conditions. As teacher competencies seem to be a key factor in teaching successfully in inclusive settings, teacher education programs must focus on the promotion of these domain-specific competencies, which can be seen as new or additional skills, behaviors and beliefs (Darling-Hammond and Bransford, 2005). As PE differs in several aspects from other school subjects, a particular focus on (pre-service) PE teachers is needed.

In recent years, several intervention studies on (pre-service) PE teachers have been conducted to enhance their attitudes and self-efficacy toward teaching inclusively. The results underline the importance of the intervention length as well as the relevance of the combination of theoretical inputs with practical experiences that should be pedagogically accompanied and reflected upon. Similar to studies of general education, some of the previous studies with (pre-service) PE teachers were limited in their results due to methodological problems (e.g., no implementation of a control group). Furthermore, it was still unclear which kind of practical experience in combination with theoretical inputs might be (more) successful in improving attitudes, self-efficacy, and stress perception of inclusive teaching in pre-service PE teacher education. Thus, we conducted a quasi-experimental intervention study with pre- and post-measurement, consisting of fifteen 90-min teaching sessions, and comparing different intervention programs (IG 1, IG 2) in relation to a control group. We hypothesized that the two different intervention groups (IG 1, IG 2) would develop enhanced attitudes toward inclusion and self-efficacy regarding teaching inclusively as well as decreased perceived stress related to teaching PE inclusively compared to the control group. Furthermore, we hypothesized that the development in IG 2, where the PE pre-service teachers underwent a combination of theoretical input and practical application, would be greater than in IG 1, where the PE pre-service teachers followed an exclusively theoretical information-based seminar.

Based on the ANCOVA analysis, we can state significant results for some subscales of the attitudes. However, there were no significant results for stress perception and self-efficacy.

The attitude “cognition” increased significantly in all three groups from pre- to post-measurement. By controlling for the mean differences at pre-measurement, the increase in IG 2 was significantly higher than in IG 1. Thus, the teaching units of the intervention groups and of the control group seem to have led to an enhancement of the cognitive aspect of attitudes toward inclusion, meaning that an inclusive school system can be implemented without any problems and that it would enhance social justice. In particular, PE pre-service teachers of the IG 2 fostered this cognitive aspect after the intervention. Whereas the information-based approach was also successful in promoting the attitude that teaching inclusively is possible, the theoretical approach in combination with practical

experience had even more impact. The attitude “promotion of academic competencies” increased significantly from pre to post in IG 2, whereas there was no significant change in IG 1 and CG. Thus, PE pre-service teachers from IG 2 experienced an increase in the belief that teachers can support equally both children with and without special needs in an inclusive context. It appears that the practical experience in which pre-service teachers of IG 2 planned PE lessons according to students’ special educational needs (e.g., learning disabilities, emotional and behavioral difficulties, physical impairments, chronic diseases and intellectual impairments) increased PE pre-service teachers’ positive attitudes toward dealing with different levels of proficiency, whereas the particular and non-particular information-based approach to teaching in an inclusive context had no impact.

The attitude “willingness to teach inclusively” showed a significant increase only in IG 2. This attitude can be seen as a behavioral-affective component and is content-related with respect to self-efficacy or control expectancy. PE pre-service teachers from IG 2 felt significantly more competent to teach inclusively after the intervention and were less afraid of teaching inclusively than PE pre-service teachers from IG 1 or from CG. Although, they did not teach “real” students with disabilities, the combination of theory and practical teaching experiences with fellow pre-service teachers had more impact on their attitudes than the purely information-based approach in IG 1 or the non-specific theoretical approach in the CG. This might be also a limitation of the present study, as teaching PE lessons with fellow pre-service teachers is an artificial context. In contrast to Reina et al. (2019), we decided not to work with a simulation procedure to prevent the risk of triggering stereotypes (Macrae et al., 1994), and to prevent negative effects of overwhelming and missing coping strategies in simulation procedures (Flower et al., 2007). However, we need future study courses in which PE pre-service teachers are theoretically prepared to teach an inclusive PE class and put into practice these theoretical units with an inclusive school class. This field experience should be theoretically reflected upon afterward. However, getting into contact with the target group seems not always the best and most effective way to promote teachers’ competencies and their underlying cognitive-affective constructs, such as attitudes or self-efficacy, as it has been shown by Anttila et al. (2018) that putting into practice theoretically planned PE lessons with a group of asylum seekers does not enhance *per se* PE pre-service teachers’ intercultural competencies and attitudes; it might even have a counteractive effect by emphasizing patriarchal feelings of superiority. Thus, we should develop teaching formats that combine theory-driven seminar units with practical experiences in teaching an inclusive PE class, which should be implemented carefully. In this context, reflection upon the experiences and especially feelings during the practical teaching situations seems to be crucial. To initiate the reflection process, video sequences from the video-recorded lessons conducted by the

pre-service teachers could be used as stimulators. Therefore, it might be important for the pre-service teachers to decide for themselves which video sequences to use for the reflection (Hinternesch et al., 2021).

Regarding the study design, a mixed-methods study combining quantitative and qualitative data seems to be crucial to understand theoretically expected or unexpected changing processes. In this regard, our study is limited with respect to quantitative data, and we do not know, for example, if and what the PE pre-service teachers experienced with respect to the intervention programs as sources to enhance their self-efficacy, as Martins et al. (2015) determined. We also did not operationalize the impact of the pre-service teachers' attitudes and self-efficacy on concrete teaching behavior outside the study context. Finally, the impact of these and other context variables (e.g., school environment) is one of the most frequently lacking or ambivalent links in research on teaching (PE) inclusively (Hutzler et al., 2019), and it needs to be tackled urgently in future studies on (PE pre-service) teachers.

Furthermore, the reflections upon the teaching experiences should also focus on the role of power relations that are anchored in the school context and have an impact on how (PE) teachers perceive their role and privileges. This aspect is underlined in seminar formats using the critical pedagogy approach, which should also be carefully implemented so as not to overwhelm pre-service teachers (see, e.g., Shelley and McCuaig, 2018). Following Barber (2018), it seems also to be important to reflect upon traditional understandings of (dis-)ability, performance, body norms, and values that interfere with a traditional understanding of elite sport. In this context, it should not be neglected that most pre-service PE teachers enter PE teacher education programs with particular (positive) socialization experiences in the (elite) sport context, and they try to remain connected to the field of sport via their occupation (O'Neil and Richards, 2018). Many PE teacher candidates were successful athletes, who had experienced physical education curricula dominated by traditional teaching strategies and contents, and they have already developed strong subjective theories about traditional sport content in PE (Richards et al., 2014). Furthermore, Morgan and Hansen (2008) found out that PE teachers' teaching strategies are linked to personal school experiences in PE. These socialization effects are reinforced by a recruitment strategy for future PE teachers that focuses on traditional sport competencies and selects those who mirror and share the traditional values and norms (Richards et al., 2020). In combination with a teaching curriculum that is also traditionally orientated toward sport, pre-service PE teachers are not challenged in their experiences and attitudes. The PE teacher candidates perceive their study courses, and later PE, just as a continuation of their sport identity (Curtner-Smith, 2017). Therefore, there is a need to reflect upon the recruitment strategies for PE teacher education and to develop a procedure to attract PE teacher candidates representing diversity in sport

and movement experiences (O'Neil and Richards, 2018) as well as in social backgrounds like gender, ethnicity, race, and socioeconomic status (Flintoff and Webb, 2012). Furthermore, we need to rethink PE teacher curricula and look for teaching strategies that challenge PE teacher candidates' experiences and attitudes. This also includes the need for critical biography work on teacher educators' socialization experiences, norms, and values, as they might be seen as crucial role models for a future inclusive PE setting (Flintoff et al., 2015).

## Conclusion

In conclusion, by taking into account the small sample size of our study as limitation, the combination of a theoretical approach with practical experiences in teaching PE units with peer pre-service PE teachers seems to have more impact on the development of positive attitudes toward inclusion than only theoretically based approaches. Thus, our study underlines the importance of mastery experiences in settings that might be similar like the "real" professional context but can be still considered as a kind of "test environment." The complexity might be reduced, and pre-service teachers might not feel overwhelmed due to probably (still) missing teaching competencies. Thus, the reflection upon the practical experiences and especially feelings during the practical teaching situations seems to be crucial. Finally, we need to develop teaching formats that are on the one hand adapted to PE pre-service teachers' competencies, but challenge on the other hand the professional development by systematically implementing opportunities for critical (self-)reflection.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by TU Dortmund University. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

EG-S conceptualized the design, was responsible for data management and analysis (parametric), and wrote the original draft including visualizing tables. MS implemented the study

design at her university, developed and described the content for intervention group, ran non-parametric analysis, and commented on the original draft. Both authors contributed to the article and approved the submitted version.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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