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The Effect of the CoI on Preservice Teachers' Self-Efficacy in Physical Education

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Abstract: Teaching physical education (PE) involves adopting contemporary instructional models and teaching methods. Especially at an undergraduate level, the teachers' participation in professional communities can support their self-efficacy in adopting context-specific instructional models, leading to an improvement in student learning. The aim of the present study was to examine the effects of preservice PE teachers' participation in a professional development (PD) program designed according to the principles of the community of inquiry (CoI) on their self-efficacy in teaching physical education using instructional models. Twenty-three preservice PE teachers (male = 11, female = 12) at the University of Athens, Greece, participated during the 2022–2023 spring semester in a PD program specifically designed according to the CoI principles to support them in the use of PE curriculum models in a secondary school practicum. A pre-post convergent mixed methodology was used, with quantitative (Ohio State Teacher Efficacy Scale, OSTES) and qualitative (semi-structured interviews) data evaluating the changes in the participants' self-efficacy in the use of instructional models. Results showed that even though the program was evaluated as effective in terms of supporting the participants' knowledge and skills on the use of the models, there were no statistically significant changes in their OSTES self-efficacy indices. Given the complexity of PE teaching and the latent structure of the self-efficacy trait, a longer duration of similar PD programs is suggested.

Keywords: CoI; physical education; teacher's self-efficacy

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Citation: Agiasotelis, E.; Karteroliotis, K.; Giossos, Y.; Dania, A. The Effect of the CoI on Preservice Teachers' Self-Efficacy in Physical Education. *Trends High. Educ.* **2024**, *3*, 827–842. https://doi.org/10.3390/higheredu3040047

Academic Editor: Heather Kanuka

Received: 8 July 2024
Revised: 13 September 2024
Accepted: 18 September 2024
Published: 25 September 2024

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1. Introduction

In the field of teaching, teacher self-efficacy (TSE) is defined as a teacher's belief in his/her ability to achieve the desired learning outcomes in terms of the students' knowledge and skill development, active participation, and motivation to stay on task [1]. As a psychological construct, TSE is developed based on the input and interaction of four sources of information: the individual's experiences and successes (enactive mastery experience), the experiences of others (vicarious experience), social persuasion, and physiological and affective states [2].

Specifically, within school physical education (PE), teachers with high levels of perceived effectiveness have more positive attitudes towards the adoption of new methods [3], use more effective student-centered teaching practices in their classrooms [4,5], and perceive their teaching environment in a more positive and creative way [5,6]. However, a teacher's TSE is more volatile during the beginning stages of their career, and very often decreases during their years of study [7]. Although many elements of a PE teacher's professional identity are shaped during their years of occupational development [8], certain occupational socialization experiences may exert a greater influence on their beliefs.

Especially within the modern era, the challenges that the teachers experience begin early during their undergraduate years and continue throughout their career (e.g., students' undesirable behaviors, large classrooms, lack of resources, etc.). The literature indicates

that a limited knowledge base can negatively impact the preservice PE teachers' skills and knowledge [9,10] needed to employ diverse teaching techniques, such as instructional models and Mosston's teaching styles, and to work towards enhancing classroom management and student comprehension [11,12]. It has been proven that teachers must adapt their teaching strategies to suit specific situations to ensure effective learning outcomes [13,14]. For this reason, there is a need for guidance and mentoring support towards this direction for preservice teachers [15,16]. Non-formal and informal learning opportunities within professional communities are the most prevalent forms of professional support and development for teachers. The community of inquiry (CoI) [17], communities of practice [18], and opportunities for engagement with the lesson study model [19], are usually suggested as the contexts for teacher empowerment. Their underlying rationale is that when knowledge is constructed through regular teaching experiences and is improved through critical reflection and collaboration with other educators, then teachers accumulate positive experiences that can support the development of their TSE [20]. The impact that the communities have on the practitioners' professional development is examined across a range of disciplines (such as law or medicine) [21], with the results being rather promising. Within the field of PE, the teachers' participation in their communities indicates positive results in their desire to accept and use contemporary teaching models and new teaching methods [22,23]. The same seems to hold true for physical education teacher education (PETE) student teachers, although the research in this area appears to be quite limited based on the review conducted by McEvoy et al. [16].

However, the studies examining the impact of the communities on the PETE student teachers' TSE show contradictory results. Some studies show that the preservice teachers' participation in the learning communities is positively correlated with their TSE [24–26] and their ability to implement new methods [27]. On the other hand, it seems that even when the preservice teachers participate in the learning communities to share knowledge and experiences, they fail to align with the philosophy of contemporary pedagogies [28] and they are not provided with enough opportunities to gain experience about the complex task of teaching [29,30].

Overall, the studies advocate for the implementation of well-designed programs and initiatives, within which preservice teachers can accumulate valuable and rewarding opportunities for their professional development [31]. The large body of research on effective teaching and the pedagogical preparation of future teachers [32,33], as well as the research on the effectiveness of professional development programs [34], suggests that the students' needs, collaborations, social interactions, and the application of high standards of professional learning should be at the foreground [35]. Among the frameworks that could support the design and implementation of the teacher's professional development programs is the CoI framework, as it was established by Garrison et al. [17] using online distance learning. Based on this framework, the teachers and learners are the key participants in a collaborative learning process within which critical thinking and discussion are encouraged and practiced through the mediation of technology and digital media. The use of technology within this framework is employed to support the teachers and learners to co-develop their ideas, build a shared level of skills and knowledge, and reach a consensus. To achieve the above outcomes, three different e-presence relationships need to be nurtured and sustained: social presence, teaching presence, and cognitive presence [36–38].

According to Garrison et al. [17], social presence refers to the communication between participants in numerous ways via the affordance offered by technology. The aim at this initial stage is for everyone who develops an affiliation with the community to present their real and authentic selves by opening and sharing their emotional characteristics and the traits of their social behavior. A sense of common purpose at this stage is the factor that fosters cooperation between the different personalities and gives the participants a collective identity. The five-part social presence approach, which is utilized to structure the blended or online learning environments, consists of the following: affective association: describes the emotional bonds between the participants; community cohesion: describes

greetings, salutations, and the sharing of resources; instructor involvement: describes the encouragement of the participants to engage in critical thinking and higher- order thinking as well as the building of relationships and social connections among them; interaction intensity: describes the degree of interaction between the participants that is demonstrated by quoting or paraphrasing the other participants' statements; and knowledge and experience: refers to the existing ideas and information that trainees bring to the learning [39].

Social presence can be manifested within both synchronous and asynchronous community interaction experiences either by using verbal forms of communication or by using non-verbal ones (e.g., emoticons, writing style, etc.). As part of community members' social presence, the immediacy of the communication plays a vital role in maintaining constructive communication over time and increases the members' perception of the importance of staying supportive and engaged. These elements are vital for the next stage of teaching presence.

The stage of teaching presence is intended to assist the community members in mastering those learning objectives and outcomes that have significance and value for their needs. At this stage, it is the community facilitator's responsibility to promote involvement, provide constructive feedback, and inspire even the least engaged members. At this stage, the facilitator's role is supportive in terms of guiding the discussions on topics of interest by providing prompts and questions, employing different team bonding activities to maintain and increase interaction, making sure that the guidelines for constructive discourse are followed, summarizing key points, pointing out ambiguities, and gathering data and knowledge from a range of sources to foster critical thinking [40,41].

Higher degrees of cognitive functioning are the goal of the cognitive presence stage in a learning community, based on Garrison et al. [17]. This stage also incorporates participatory teaching practices developed throughout four phases. Initially, a triggering event (e.g., a contemplation, a confusing and difficult problem or question, or an unresolved problem that might originate in a member's individual experiences) initiates the interaction process. Based on this trigger, the members start exploring the nature of the underlying issue, and the degree to which the causes of the problematic events/situations/practices can be investigated. Based on the members' input, the triggering topic is thoroughly examined regarding certain aspects that may contribute to its solution during the integration phase, through both individual and group reflection and discussion. The previously organized solution is transferred to an implementation and evaluation procedure in the last, or resolution, stage.

A professional development program that provides teachers with opportunities for collaboration and interaction within learning or inquiry communities, as well as the practical application of knowledge (see pedagogical content knowledge) and content knowledge (e.g., PE teaching models), can enhance their teaching skills and TSE [42,43]. Studies on the impact of learning communities on PE teachers and trainees have focused mainly on professional development through communities of practice, with positive effects on content literacy, the psychological empowerment of teachers, and their focus on students' learning needs [42–44]. To create valuable and significant changes in teaching, the CoI offers the structure needed for the planning and implementation of a well-organized paradigm and a set of guidelines [45,46]. With the aim of fostering and assisting the learning communities, the frameworks designed for online and hybrid learning environments, as well as higher education in general, can be applied in face-to-face and mixed learning settings [47,48].

As part of modern pedagogical approaches, the use of PE instructional models seems to provide an advanced structure and a range of successful strategies and approaches for lesson planning and implementation [49]. Focusing on the teacher–student–content interactions, these models (e.g., teaching games for understanding, sport education, adventure education, outdoor education, cultural studies, etc.) use pedagogical content knowledge in the design and implementation of a PE curriculum based on student-centered teaching methods, in alignment with students' needs and with context-specific requirements. The above models, relevant to modern age requirements like inclusion and cross-disciplinary

instruction, require teachers to change their attitudes and recognize their role as facilitators. This occurs gradually through familiarity with various pedagogical methods within the learning communities.

The systematic review by Valério et al. on the application of the PE instructional models by preservice PE teachers provides important evidence to support the above arguments [50]. The same authors argue that the use of such models on microteaching courses and for assignments reinforces the preservice PE teachers' sense of "belonging" and social contact, which in the long run can positively affect content knowledge ("how a technique is performed") and pedagogical content knowledge ("how to teach it"). Further, social contact, interaction with fellow preservice teachers, and engagement with authentic pedagogical cases are considered as basic ways of professional learning and are suggested to be used within the professional development programs which follow the design principles of socio-cognitive theory (e.g., see the communities of inquiry).

Despite the above, until today no study has been conducted to evaluate the changes observed in the preservice PE teachers' TSE when using PE instructional models (e.g., TGfU) within community-centered PD programs.

Based on the above, the aim of this study was to examine the impact of a PD program for preservice PE teachers, designed using the principles of CoI, on their TSE in using modern instructional models in school practice. With a specific focus on the teaching games for understanding (TGfU) [51], the sport education model (SEM) [52], and the teaching personal and social responsibility (TPSR) [53] models, the basic research hypothesis was that there would be a statistically significant change in the participants' TSE in using these models after their engagement with the CoI of a specially designed PD program. The research questions that this study set as the focus were: Can a program of this kind impact the participants' TSE? What aspects of the CoI could better support such a program implementation?

2. Materials and Methods

2.1. Participants

Eleven male and twelve female preservice PE teacher (n = 23) third year undergraduate students in the School of Physical Education and Sports Science (SPESS) at the National and Kapodistrian University of Athens (NKUA) participated in the study. Participants were selected based on their interest and their availability to attend a four-month professional development program designed according to the CoI principles of the Garrison et al. framework [11]. Informed consent was obtained before the beginning of the program and all research procedures were approved by the ethics committee of the SPESS (approval number: 1462/11-01-2023).

SPESS/NKUA as a higher education institution has many students who conduct practicum in primary and secondary schools. Students are organized into pairs and each pair undertakes the teaching of PE in a primary (18 teaching hours in the fifth semester) and a secondary school (20 teaching hours in the sixth semester). As part of their practicum, preservice PE teachers also attend a teaching methods compulsory course focusing on sport pedagogy principles, teaching methods, and curriculum/teaching models. During the practicum, preservice PE teachers are supervised by the PE cooperating teachers who have previously attended a series of online seminars, co-organized by the Laboratory of Sports Pedagogy and Didactics of Physical Education in the SPESS at the NKUA. Also, scheduled visits are made to the collaborating schools by the supervisors from the NKUA. The purpose of each visit is to observe the preservice teachers during instruction and to provide the relevant feedback, as well as to discuss with the schools' cooperating PE teachers any issues related to the proper organization and operation of the practicum.

2.2. The Professional Development Program

For the purposes of the present study, an intervention program was designed, aimed at the promotion of the preservice PE teachers' TSE in the design and implementation of daily

lessons at a school using the principles of a model-based instruction. Particularly, after their attendance on the program, participants were expected to be able to: (a) design daily lesson plans for their PE classes according to the principles of a model-based instruction, (b) practically apply these lessons within their secondary school practicum, and (c) identify any issues related to the application of these models and the process of PE teaching during their practicum. The program was designed according to the stages of a CoI and engaged the participants in various opportunities for sharing and interaction, as part of their PD experiences.

During the first stage of the intervention program, the participants responded to a short survey, by submitting online their views on what counts as quality PE teaching, along with their experiences of teaching in previous grades. The purpose of the second stage was to engage the participants in the activities of lesson study. Considering their previous teaching experiences and views about teaching, as these were documented and analyzed during the previous stage of the program, the first author prepared a purposefully planned professional development package, with power point presentations and handouts on the principles of model-based teaching. Particularly, the key principles of the TGfU [51], the SEM [52] and the TPSR [53]. Instructional models were analyzed via a two-hour synchronous online webinar. During this webinar, the participants first attended a presentation by the first author and afterwards discussed and shared comments and feedback on the use of model-based instructions within school PE. As part of this webinar, participants also had to (a) study the relevant training material, which was posted on the an online classroom (eclass), (b) complete online a purposefully developed multiple-choice questionnaire to self-assess their knowledge and understanding of model-based instructions, and (c) complete an individual assignment that required the preparation of a list of assessment criteria for evaluating their students' progress after the implementation of the model-based instruction. Evaluation focused only on the three instructional models.

The aim of the third stage was the in-depth study of PE teaching via the application of the content and theory discussed and explored in the previous stages. Two face-to-face microteaching sessions, lasting ninety minutes each, were conducted at this stage. Field hockey was chosen as the context for implementing and experimenting with model-based instruction in practice. Field hockey was chosen purposefully as an indicative example of an invasion game, which required skills (e.g., stick handling) with which none of the participants were familiar. This was expected to facilitate knowledge and skill exploration during the program, ensuring that all participants would start at the same level of skill practice and technique. Within each microteaching session, the first author used model-based principles to facilitate the participants in the design and implementation of the lesson activities. Participants cooperated, based on the first author's guidelines, in the design, observation, and evaluation of the lesson activities, always in alignment with the instructional model that was being used. During the fourth stage of the program in the school practicum, the participant pairs implemented the lesson plans which were designed according to the principles of their preferred model. As part of this stage, the participants joined a private online Facebook group, with the purpose of sharing material, experiences, and feedback from the practicum and the model-based lesson design. The online Facebook group was created by the first author, who was also the administrator of the group. Daily, the first author ensured that all participants engaged actively with the topics posed, gave feedback, and directed the discussions on topics related to the program and the subject of the investigation. Discussion topics concerned the issues to be resolved (questions, concerns, difficulties, ideas, solutions), effective practices, and practices to be avoided. To ensure that all participants engaged in interaction and active communication with each other, the first author asked everyone to raise a topic for discussion at least once during the week, requiring all the participants to respond and comment on at least five topics and to interact (post a "like") with each other on all the topics raised.

To ensure the fidelity of the application of the models, the researcher collaborated with the cooperating PE teachers who were supervising the participants' practicum at

school. All cooperating PE teachers were informed about the goals of the program and were given specific guidelines on the procedures that needed to be followed during the research participants' practicum at school. As part of their practicum duties, participants emailed the daily lesson plans to the first author, before implementing these at the schools. The first author sent feedback to each participant separately and shared comments with the cooperating PE teachers after each lesson was implemented at the school.

2.3. Data Collection and Analysis

A convergent mixed methods design was used for the data collection and analysis, based on two datasets (quantitative and qualitative data) which were compared to produce a more complete understanding.

In terms of the quantitative data, the Ohio State Teacher Efficacy Scale (OSTES) questionnaire developed by Tschannen-Moran and Woolfolk Hoy (2001) [1] was used to assess the participants' TSE. The questionnaire has been culturally adapted to Greek PETE students [54] and has demonstrated very good psychometric properties with Cronbach's reliability [55] ranging between 0.85–0.92. It consists of the following three factors (five questions per factor): (a) instructional strategies (e.g., "...do you implement alternative teaching methods in your classroom"), (b) classroom management (e.g., "...respond to disobedient students"), and (c) student engagement (e.g., "...motivating students who show reduced interest"). For each factor, the questions begin with the phrase "To what extent can you...". Responses follow a 9-point Likert-type scale (1 = not at all, 9 = to a very large extent). It was completed once before the start of the program and once at the end of the program by all twenty-three participants.

Further, the participants' satisfaction concerning the support they received during the different stages of the CoI was evaluated with the use of a questionnaire developed by Arbaugh et al. [56]. This specific questionnaire was employed to assess the degree to which the PD program addressed the participants' expectations and aligned with the principles of the CoI. The questionnaire consists of three factors for assessing the participants' engagement with the activities of the CoI on three different 'presences': (a) teaching presence (e.g., "The instructor clearly communicated the important topics of the training" with 13 items; (b) social presence (e.g., "The forum discussions helped me develop a sense of collaboration" with nine items; and (c) cognitive presence with 12 items (e.g., "The learning activities of the training helped me generate interpretations and solutions"). The questionnaire has been translated into Greek by Theodosiadou et al. [57] with an internal consistency reliability ranging between 0.72–0.85. Responses follow a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree). Cronbach's reliability for the questionnaire ranges between 0.91–0.95 and its scores are interpreted in terms of the numerical values/scores per presence. In the present study, the scores per different type of CoI presence were interpreted in unison with excerpts of the messages communicated within the PD social media as part of the CoI interactions.

In terms of the qualitative data, semi-structured interviews were used for a total of ten participants. The goal of the interviews was to explore the participants' experiences of participation in the PD and gain a better understanding of their perceptions concerning the use and implementation of the CoI as a framework that could afford a possible change in their TSE concerning the use of instructional models. As already mentioned, excerpts of the participants' discussions on social media were also included in the qualitative data analysis.

Following the study design, paired sample *t*-tests (before and after the implementation of the PD program) were used for the quantitative data analysis, with normality tests conducted for all TSE variables. Further, descriptive statistics were used to calculate the scores of the participants' perceptions concerning the different types of CoI presence within the PD program. The qualitative data (interviews and online discussions on social media) were analyzed with the use of thematic analysis. The themes that emerged from the thematic analysis were compared and analyzed in unison with the scores of each CoI presence, namely social, cognitive, and teaching, as suggested by Arbaugh et al. [56]. The

first and last authors separately recognized and classified the meaning of each interview transcription and each excerpt from the social media conversations that were pertinent to the research questions. Both authors worked together to refine the final list of codes and discussed how the codes related to the potential themes until the final category, which was further developed. In order to determine the extent of the agreement between the two data types, the mean scores of the OSTES questionnaires were diverged and correlated with the themes of the interviews and the scores of the CoI presences to explore in depth the impact of the PD program on the participants' TSE. To further ensure the dependability of the data, the content of the discussions on the web app and the email conversations that the participants had between themselves and with the community facilitator, was transcribed verbatim and used as a source of qualitative data related to the types of presence in an inquiry community. Regarding credibility, triangulation was made possible during the data analysis based on the authors' diverse backgrounds and professional experiences. To ensure reliability, efforts were made to provide comprehensive details on the methodology used for the analysis. Additionally, sample quotes were included from the interviews with corresponding codes so that the reader may evaluate the confirmability. For statistical analyses, the IBM SPSS Statistics (Version 27) was used [58], while for qualitative data importing and coding the Nvivo software (Version 12) was used [59].

3. Results

Overall, the results showed that there were no statistically significant changes in the participants' TSE, in any of the assessed OSTES parameters (e.g., classroom management, student engagement in class, implementation of appropriate teaching strategies), even though their expectations and engagement with the CoI scored high indices of presence. Particularly, the mean scores of the participants' social, cognitive, and teaching presence during the intervention program were 4.00, 4.34, and 4.66, respectively. In terms of their experiences of participation in the program, the interviews produced three main themes: program organization, instructional models, and interactions. These themes were also supported by the data transcribed from the social media group discussions and email conversations. The different types of findings are presented more analytically in the following paragraphs.

3.1. Quantitative Findings

The normality test that was conducted for all TSE variables through the Kolmogorov-Smirnov analysis showed a normal distribution for all OSTES variables: (a) "classroom management" [D (23) = 0.097, p = 0.200], (b) "student engagement in class" [D (23) = 0.095, p = 0.200], and (c) "implementation of appropriate teaching strategies" [D (23) = 0.118, p = 0.200]. Furthermore, for the "classroom management", skewness was 0.22 and kurtosis was −0.92, for the "student engagement in class", skewness was 0.14 and kurtosis was −1.07, and for the "implementation of appropriate teaching strategies", skewness was 0.10 and kurtosis was −0.93. Further, there were no outliers for any variable.

The paired sample t-tests showed no statistically significant differences in instructional strategies [t (22) = 0.85, p = 0.201, d = 0.178], classroom management [t (22) = 0.24, p = 0.855, d = 0.050], or student engagement [t (22) = 0.25, p = 0.404, d = 0.051] after the PD program attendance (Table 1).

Table 1. Teacher self-efficacy scores before and after the implementation of the program.

Variable	Score	TSE	95% Confidence Interval
Instructional Strategies	Before $M \pm SD$ 6.95 ± 1.06	After $M \pm SD$ 6.73 ± 1.34	−0.32 to 0.76

Table 1. *Cont.*

Variable	Score	TSE	95% Confidence Interval
Classroom Management	$M \pm SD$ 6.35 ± 1.35	$M \pm SD$ 6.28 ± 1.20	−0.53 to 0.67
Student Engagement	$M \pm SD$ 6.30 ± 1.03	$M \pm SD$ 6.37 ± 1.06	−0.65 to 0.52

3.2. Qualitative Findings

The quantitative findings were in contrast with the participants' evaluation of their engagement in the PD program in terms of the degree to which they experienced progress and support as part of the CoI social, cognitive, and teaching presence. Based on the scores on a 5-point scale per type of CoI presence and the guidelines proposed by Garrison [43], community presence was evaluated positively by the participants, showcasing their positive experiences from their interactions with the other students and the facilitator (Table 2).

Table 2. Community presence: means of the three factors of the Arbaugh questionnaire triangulated with the thematic analysis of online discussions and emails.

Factors-Themes	$M \pm SD$	Sub-Themes	Number of Abstracts
Social Presence	4.00 ± 0.50	Group cohesion	20
		Open communication	20
		Affective expression	9
Cognitive Presence	4.34 ± 0.54	Trigger event	18
		Solution	62
Teaching Presence	4.66 ± 0.39	Design and Organization	20
		Instruction	10
		Facilitating discourse	3
		Positive reinforcement	25

Particularly, the interactions of the participants in the social media conversations revealed high levels of social presence. Their weekly discussions during the program included several posts that indicated a response to each other's posts, suggesting that as the program progressed, participants were interested in reading, responding to, and giving feedback on others' comments. In the forty-nine social presence participant quotes that were retrieved from the online discussions, elements of group cohesiveness (e.g., "good evening my team"), open communication (e.g., "Please let me know if you are having the same problems at other schools…"), and affective expression (e.g., "I hope that none of you have to walk in our shoes today…") were the most prevailing.

Correspondingly, the cognitive presence within the group discussions focused on issues related both to their own concerns and to the concerns of others related to the completion of the school practicum. Participants were interested in making and receiving recommendations on the implementation of the teaching models and on seeing what their fellow students did in similar cases. In fact, many of the issues that were highlighted as a trigger for discussion were negotiated and, in many cases, resulted in solutions that emerged from the participants themselves. This was the reason that, for the cognitive presence, eighty quotes emerged from the reading of the group discussions, being categorized either as questions or dialogues (e.g., "I would like to ask whether lessons with the TGFU

model can also include games for fitness development or only sports games" or "But the question here is about something else entirely: is it okay to play an introductory game with one group of kids and a technical game with another set of kids and then switch roles in accordance with the TGFU model?") that could open up opinion sharing, asking for advice, or presenting a problem and asking for its solution. Solutions came either from personal opinions (e.g., "To help the kids feel more independent and motivated to participate in the activities and sports you perform, you may also employ the TPSR method to encourage cooperation. . ."), or from the incorporation of the conclusions the participants made based on their experiences (e.g., "Our two third-grade classrooms initially worried us since the students would soon be completing their national examinations and we thought they would become tired and uninterested in the subjects. But there was a lot of engagement, and we observed very good outcomes, particularly when we used composition exercises that increased in difficulty and forced students to think. . .").

In the teaching presence, fifty-eight participant quotes were retrieved, which related to the instructions on how to organize the program activities (e.g., "I'll be waiting for you tomorrow, outfit and all, for our hockey lesson centered around modified games. Two groups will be formed from us. The observation list will be given to one group, which will thereafter practice, and vice versa. Hockey requires a high level of physical fitness and motor abilities. . ."), immediate feedback such as for corrections to the daily schedules (e.g., ". . .Change the questions so that there is a specific tactical answer. . ."), and positive reinforcement about their teaching process, both from the researcher (e.g., ". . .Well done! Your programs are well-structured and creative.!") and from the participants (e.g., ". . .I think it is a very nice and original idea I think they will find it very interesting and will like it. . ."). Regarding the teaching presence, this was established during the implementation of the program through the explanations, feedback, and counseling support given by both the participants and the researcher to each participant individually. Extremely important was the fact that the teaching presence functioned as a kind of facilitator of the participants' learning as they had to apply the teaching models as they were taught as well as the course material in the context of their studies at SPESS.

The analysis of the semi-structured interviews showed that the participants' views concerning their attendance on the PD program addressed similar issues as those prevalent in the types of CoI presence. Particularly, the three main themes that were produced from the interviews at the end of the program were: (a) organization, which referred to parameters related to the PD program organization, methodology, and utility for their professional learning, (b) instructional models, which referred to their positive experiences of engagement with the modern instructional models, and (c) interaction, which referred to the value they found during the exchange of views, ideas, and concerns within the CoI environment.

Regarding the organization theme, the participants felt that it helped them to understand and clarify the structure of a PE lesson and be able to deal with the challenges of large classrooms or misbehaving students. As participant #2 states:

> "*. . .because it was very explanatory as to what was needed to make us so knowledgeable and ready to create o lesson plan for a large group of children. . .*" (participant #2)

The way that the PD program was established also seemed to have a positive effect on the participants' professional upbringing and their ability to interact with like-minded colleagues who were facing similar issues. As the participants in the following interview quotes suggest, the clear goals of the PD program gave them multiple opportunities to structure and restructure their lesson content in ways that could best fit with their circumstances:

> "*It affected me in terms of the fact that we were a more close-knit community and had specific goals. . .*" (participant #6),

> "*. . .It put us in the process of thinking of solutions to a problem that we may not have, but that could happen to us. . .*" (participant #10),

"*. . .We were entering a context where the goal each time was clear what we wanted to teach. . .*" (participant #10).

In relation to the instructional models theme, the quotes from the interviews revealed that it was significant for the participants to elaborate their content and pedagogical content knowledge as a group and to engage in opinion sharing that could help them shape their instruction and use of the models accordingly. As is evident from the interview codes below, the exchange of information on the instructional models positively affected the participants' teaching experiences and their emotional resilience during the practicum:

"*. . .Many times, we even took games to modify them and used them in others aims we want. . .*" (participant #2).

Also, they perceived an equally positive impact on their TSE because of the exchange of information and experiences within the program:

"*. . .Yes, it influenced me because we were saying different opinions. And constantly hearing new ways of solving problems that maybe we hadn't thought of. . .*" (participant #5),

"*. . .It affected me positively because it helped me better understand how these instructional models work and how they are applied. . . Through this sharing of concerns, there were multiple solutions.*" (participant #9).

Although they all acknowledged the difficulties in implementing instructional models, the participants perceived that the PD program facilitated their knowledge and skills of primarily the TGfU model and secondarily the sports education and TPSR models:

e.g., "*. . .the models are special, and they are essentially new, and the students are not used to such teaching methods, and we do not know how they might react. . .*" (participant #3).

Many of them admitted that with the use of the instructional models they could achieve a variety of learning goals and in this way help their own students to develop holistically, and not only in terms of their motor development. As they said:

e.g., "*. . .The PD program also helped us to properly design the lesson program so that students understand and actively participate in each sport. . .[motor and cognitive goal]*" (participant #10),

"*. . .The model pushes children to think critically. . . and find solutions. . .*" [cognitive goal] (participant #9),

"*. . .It gave a very interesting structure to the lesson with competition, with groups and I think it brought the children much closer, especially of older ages. . .*" [socio-emotional goal] (participant #8).

Finally, in terms of interactions, it was shown that the PD program was evaluated as a positive social experience that helped the participants feel accepted and valued, even in cases where they were frustrated or overwhelmed by the situations occurring within their practicum. As they shared, interactions and connections were established both when they were receiving support, and when they shared experiences that may have had a negative impact on their TSE:

"*. . .It made me feel that I'm not doing anything wrong, that some things are happening to everyone that were happening in the. . . in our own lesson. . .*" (participant #10),

e.g., "*. . .[I could not deal] with [those] unwanted behaviors of students, something that I did not face in any way in my own school. . .*" (participant #3).

4. Discussion

The aim of the present study was to assess the effects of a PD program—designed according to the principles of the CoI—on preservice PE teachers' TSE when applying instructional models within a school practicum. By following a convergent mixed methods

study design, quantitative and qualitative data were collected and analyzed to attain a comprehensive understanding of the participants' TSE and their experiences of participation in the program. The main finding was that, even though there were no statistically significant differences in the participants' TSE after the completion of the program, their perceived value of the engagement and teaching experiences showed positive trends in change at the end of the program. Such a change was also evident in the way they experienced the social, cognitive, and teaching dimensions of their presence within the program. These findings are analyzed in the following paragraphs in relation to the relevant literature.

What became evident throughout the conduction of the present study was that PE teaching is a complex activity that addresses the various systems of any classroom ecology. Both the different parameters of the OSTES questionnaire (i.e., instructional strategies, classroom management, and student engagement), the dimensions of the CoI presence (i.e., cognitive, social, and teaching), and the themes from the qualitative data analysis (i.e., program organization, instructional models, and interaction), support the claim that as different systems interact (teaching, management, interactions), multiple effects are produced, shaping the teachers' experiences accordingly. In this study, the scores of the cognitive, social, and teaching presences of the CoI were very high, and the analysis of the excerpts of the discussions revealed many positive experiences of engagement across all levels of teaching. Even if such an engagement could not produce statistically significant differences in the preservice PE teachers' TSE, it was clear that the PD program helped them to effectively address the issues that emerged during teaching.

Similar findings were found in studies conducted by Yudhiantara [60] on thirty English language instructors and by Saadatmand et al. on twenty-five pupils [61]. In both studies, and in the study of Zheng et al. [62], it was found that even though various types of presence can be enacted as part of the teachers' interactions within the PD programs, these are not always sufficient to bring changes in their TSE, especially when the latter is mainly measured in quantitative ways.

Particularly, the study by Zheng et al. on primary school teachers found that only one of the five elements of a professional program (reflective dialogue) was a predictor of TSE [62]. Also, from Topçu and Çiftçi's study of fourteen science preservice teachers, only four were able to increase their TSE [63]. For eight of them the TSE did not change, and for two it decreased. These findings suggest that TSE is a latent construct that cannot be easily measured and apprehended in its entirety, since it is affected both by individual (e.g., motivation, interest) and social (e.g., interaction, support) parameters. In the present study, even though the participants felt valued and received support as a result of their participation in the program, this was not adequate to change their individual concerns or traits related to TSE. Further, the fact that they were expected to understand and apply in practice modern instructional models seemed also to put an extra concern and challenge on their ability to handle instruction effectively. Such an issue proves that a longer program duration may be needed to support teachers in their attempts to apply innovative approaches in their practice.

Based on the findings of relevant studies, a longer program duration can be beneficial for supporting teachers, especially when it is structured in consecutive stages. Particularly, in the study of Zonoubi et al. [64], a six month professional development program focusing on supporting ten language teachers' TSE brought a significant increase in their ability to comprehend and apply innovative approaches [65]. There were two semesters during this program, and data was collected in many stages. Furthermore, Lakshmanan et al.'s study on scientific educators who took part in a three-year program through learning communities found that there was an increase in their TSE, especially when using creative methods [26]. However, as the evaluation was conducted using correlations over the course of the three-year program, it could not be argued that the program participation improved the teachers' SE or that improving TSE contributed to the successful application of these methodologies. Similar findings were reported in Wang and Zhang's study of 456 middle school teachers who, at some point in their career, had taken part in a professional development program.

They found that the program quality had a positive effect on TSE [65]. All authors, however, note that the programs yield higher results when they are implemented for longer time periods [26,65]. This suggestion is congruent with the calls for developing PD programs especially focusing on teachers' pedagogical training and their ability to adapt their content knowledge into pedagogical forms of instruction that are contextually relevant. Cone's study further adds the importance of community-based service learning in the development of initiatives focusing on the teachers' empowerment and support to enact effective forms of instruction [66].

A rather significant finding in the present study was the participants' positive experiences of professional interaction and engagement with modern PE and teaching models. Based on the qualitative findings, as participants were gaining knowledge and skills on the use of the models, they were able to better articulate the elements related to TSE (e.g., instructional strategies, classroom management, and student engagement), while also being in the position to come up with practical solutions both for themselves and for their fellow students. Such an achievement seemed to have a positive effect on their level of teaching skills, as well as on their ability to develop detailed classroom procedures for using the models and objectives that best addressed the context and situation. Although in many of the cases the exchange of common concerns was beneficial for enhancing the participants' teaching resilience, there were also cases where the participants felt overwhelmed by others' concerns. For this reason, an appropriate teaching presence and the readiness of the facilitator-administrator of the community were necessary to manage such a phenomenon. Based on the relevant literature, the presence of a community facilitator is important, but bounded feedback encourages the participants to take the initiative in discussions, which leads to more social functional interactions between them [67]. According to Costley, learners are more able to critically engage with the content in learning environments that provide equal opportunities for instruction and social interaction [41]. Further, their capacity to critically analyze information is enhanced by extra training sessions, especially in cases where the instructors' model abstract reasoning techniques [41]. Since lesson modifications can result in different outcomes, teacher educators should concentrate on designing instructions in ways that are optimal for the needs of their learners [41,68].

Another factor that must be mentioned at this point is that, in the present study, the participants' TSE scores before the start of the practicum were already high, which minimized the possibility of increasing their TSE at the end of the program. Higher TSE scores imply more effort and perseverance, which leads to better performance, which in turn leads to increased TSE. The reverse is also true. The lower TSE scores lead to less effort and easy dropout, which leads to poorer teaching outcomes, which then produce reduced TSE [1]. However, the above cyclical model can be challenged, especially in those cases where teachers cannot combine reflection and action [69,70]. The fact that most of the participants were either active athletes or worked part-time in coaching clubs enabled them to engage with the PD program in a positive way. However, the demands of model-based instruction along with the age of the students in their practicum created a cognitive and socio-emotional barrier for them in terms of further showcasing the positive changes in their TSE. However, the fact that they were able to produce workable answers to problems in the field of PE was a rather positive change in their teaching skills, even if it was not possible to alter their TSE. Similar studies show that the effect of emotional states on a teacher's TSE can be mitigated by how individuals manage these situations to be more effective, e.g., in managing their classes and interacting with students [71,72]. Such self-regulation likely requires teachers to become aware of their feelings first. High SE requires intrapersonal emotional intelligence, reflection, and teaching flexibility [73].

5. Conclusions

The present study focused on preservice PE teachers' self-efficacy as an element that is pivotal for effective instruction and the establishment of a fruitful learning climate. As was evident from the results of the mixed methods data analysis, participation in a CoI

enables teachers' professional development and can have a greater impact on their TSE when they are given the opportunity to apply their new knowledge and skills in authentic environments; what is needed are the opportunities to apply their knowledge to real case scenarios so that the solutions proposed within the CoI can be applied and tailored to the group's needs [68–70]. In the present study, the group of participating PE preservice teachers sought social interaction and support from their peers and the community facilitator to manage their duties effectively and share their concerns and knowledge. These forms of sharing and interaction enhanced their cognitive presence within the program and enabled the participants to apprehend the instructional models adequately to apply their principles in school practice. However, such a form of apprehension was not enough or adequate to support changes in their TSE. The likelihood of positive changes in TSE as a result of the teachers' participation in a PD program depends on the conditions or situations that prevail within the program, as well as whether the participants consider these situations as challenging or not. Given the complexity of PE instruction, the provision of challenges when teachers engage with new teaching practices and instructional models can lead to advances in their professional learning and development [69]. The limitations referenced above should be taken into consideration when interpreting the current results. The participants in the present study conducted their practicum in various public secondary schools, where there may have been different sports equipment and courts, different feedback from the consultant PE teachers, and different student ages (middle school or high school), which may have affected what they perceived as TSE. Finally, the facilitator-administrator required all participants to respond and comment on at least five topics and to interact with each other on all topics raised to guarantee that all participants engaged in interaction and active communication with one another. Such a restriction, or the format of a different restriction, may also affect the quality of communication in a CoI.

The key take-away message from this study is that it is not adequate to make claims about TSE by depending only on a single survey or on discrete observations during a period of time. TSE is a multidimensional concept which is dependent on both individual and social traits that frame a teacher's identity. Therefore, it is suggested that in future studies a wider variety of evaluation methods and tools are adopted to trace the path of change in TSE, bringing into the investigation other parameters of meaningful instruction such as the learners' needs and interests, the teachers' decisions and choices, as well as the learning climate and pedagogical content knowledge. The latter could provide a more holistic overview of the characteristics of instruction and the principles of good practice.

Author Contributions: Conceptualization, E.A. and A.D.; methodology, E.A., A.D., K.K. and Y.G.; software, E.A. and A.D.; validation, E.A. and A.D.; formal analysis, E.A. and A.D.; investigation, E.A.; resources, E.A. and A.D.; data curation, E.A. and A.D.; writing—original draft preparation, E.A. and A.D.; writing—review and editing, E.A., A.D., K.K. and Y.G.; visualization, E.A. and A.D.; supervision, A.D., K.K. and Y.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of School of Physical Education and Sport Science, University of Athens, Greece, approval number 1462/11-01-2023.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data is unavailable due to privacy or ethical restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

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