

How Do Preservice Teachers Produce and Reproduce Knowledge When Participating in a Subject Matter Course?

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Abstract

Scholars have highlighted that physical education teacher education (PETE) reproduce a managerial rather than educational notion of physical education (PE) teacher professionalism. Research grounded in explicit theories of learning can productively contribute to reflective discussions of teaching and learning in PE practices, for example PETE's role in promoting professional knowledge and critical judgement. The aim of the study is to empirically explore, from a transactional approach, what happens in learning occasions when preservice teachers (PSTs) participate in a PETE subject matter course. The purposive sampling resulted in choosing a group consisting of 24 PSTs (11 female students and 13 male students) studying a course given at one Swedish PETE institution. Data consisted of field notes from participant observations during 28 lessons. A practical epistemology analysis was used to explore how knowledge is produced and reproduced in PETE lessons. Two major themes were found in the analysis: indeterminate situations connected to (a) PSTs developing movement capability and (b) PSTs developing a teacher's perspective. The indeterminate situations the PSTs noticed, which varied between two types of staged encounters and elements in PETE characterised by a theory-practice dualism, seemed to contribute to certain processes of inquiry but not others. Within both themes, a contextualisation of the covered subject matter and the teacher educators' use of concepts were important to the direction of the PSTs' learning processes. An understanding of the role of inquiry, and of how individuals' prior experience take part in learning processes, are argued to be important in PETE teaching.

Keywords: preservice teachers, subject didactics, John Dewey, practical epistemology analysis, learning, inquiry, experience, physical education teacher education

Introduction

Internationally, physical education (PE) has been criticised over time for being a marginalising and excluding space (e.g., Dowling 2006; Makopoulou and Thomas 2016; Tinning 2016). Despite several curriculum reforms, the structure and content in PE have been found to be difficult to change (Kirk 2009). Thus, the question has been raised as to whether PE teacher education (PETE) equips prospective PE teachers with the necessary knowledge to provide education to pupils from a diverse range of social backgrounds and abilities (Dowling 2011; MacPhail and Tannehill 2012). As part of this discussion, scholars have highlighted that PETE seems to reproduce a managerial rather than an educational notion of PE teacher professionalism by centring on the PE teacher as a performer and less on critical reflection (Dowling 2011). Advocates of a socio-critically oriented PETE point out the importance of preservice teachers (PSTs) learning to constantly question their PE teaching, including who is benefited and/or excluded (McCuaig and Enright 2016; Pill and Brown 2007). However, studies have shown that both teacher educators' and PSTs' deeply ingrained dispositions towards the practice of sports only seem to contribute to weaker forms of reflexivity in pedagogical philosophies and practices in PETE (Ferry 2018; Mordal-Moen and Green 2014). In addition, decontextualized subject content knowledge in learning outcomes and examinations in PETE are problematized in connection to a reproduction of skills-oriented and performative discourses (Backman and Larsson 2016; Backman, Nyberg, and Larsson 2020; Kirk 2009). Taken together, both in Sweden and internationally, one important aspect of the seemingly low impact of PETE on PE in schools seems to concern difficulties in challenging the PSTs' perceptions of PE (cf. Larsson, Linnér, and Schenker 2018; McCuaig and Enright 2016).

Quennerstedt and Maivorsdotter (2016) put forth that research grounded in explicit theories of learning can productively contribute to reflective discussions of teaching and learning in PE practices. One such discussion regards PETE's role in promoting professional knowledge and critical judgement. The study of Maivorsdotter, Lundvall, and Quennerstedt (2014) is an illustration of how a reconceptualization of prospective PE teachers as learners can clarify how different ways to participate are valued and marginalized in PETE. Maivorsdotter and colleagues found that PSTs tend to participate in PETE lessons with the main purpose of developing as an athlete, and further discussed how this position risks overshadowing al-

ternative educational positions. The authors made an important contribution to the understanding of PSTs' learning processes but suggested more in-depth studies. Inspired by Maivorsdotter, Lundvall, and Quennerstedt (2014), this study started from the outlined research problem and set out to contribute to an understanding of the connections between how knowledge is produced and reproduced in PETE.

PETE is a context in which education is largely of an embodied, practical character and closely connected to the context of sports. Hence, there are advantages in methodologically avoiding common dualisms, such as body–mind and individual processes–sociocultural contexts (Quennerstedt, Öhman, and Öhman 2011). The ambition in this study is to revisit John Dewey's ideas of learning as a so-called transactional process that is not only physical but intellectual and moral (Dewey [1938a] 1997, 36). Dewey highlights knowing as something that has to do with the reciprocal relationship between our actions and their consequences, and knowing is seen as an activity or a mode of doing (Biesta and Burbules 2003, 30, 85). Central to a transactional approach to learning is the view that “both meaning and knowledge are created *in* language, *in* our relations with the environment through our actions *in* the world – in other words *in* transaction” (Quennerstedt, Öhman, and Öhman 2011, 166). According to the transactional approach, for individuals directly involved in an ongoing transaction (e.g., communication during a PETE lesson), there is no division between language, meaning, and reality (cf. Wittgenstein 1967). Thus, the transactional approach enables a study of learning that actually takes place in actions during the learning occasion, and an *in situ* study of PSTs' encounter with a PETE subject matter course, described in detail in the context paragraph, was chosen. From the backdrop of the ontological and epistemological assumptions of the transactional approach, an overarching point in this study is that learning occurs when the PSTs make meaning in transaction in PETE learning occasions. A theoretical understanding of this learning process is elaborated upon below.

Theoretical Framework

As a point of departure for studying what takes place during learning occasions in a PETE context, Dewey's concept of experience is used. From a Deweyan perspective, learning from experience is one of the cornerstones of education and growth. When the PSTs participate in social interaction

during PETE, they are active co-creators of meaning in the specific, situated practice. All participants, their earlier experience, and what is experienced in an *encounter* affect each other in a transaction. Hence, learning from experience is an ongoing process where both the individual and the environment have potential for change (Dewey and Bentley [1949] 1991). Knowledge, as such, cannot be seen as something static. Instead, an important feature in investigating learning from a transactional approach is an understanding of the interplay between change and continuity (Öhman 2008; Quennerstedt, Öhman, and Öhman 2011). Following Dewey ([1938a] 1997), the PSTs' earlier experience (i.e., knowledge, values, habits, etc.) serve to modify potential (trans)actions that might occur in their encounters within the context of PETE. In an encounter, continuity is understood as prior experience that is reactualised to make meaning in a new situation, and change is understood as the way experience takes on a differentiated or extended meaning (Dewey [1938a] 1997). Thus, experience is seen not as a fixed entity that belongs to the past but as something that is reactualised in, and construed *relations* to, the circumstances of an ongoing transaction.

Furthermore, human action has a direction, a *purpose*, or an orientation, and, consequently, the future is already present in the transaction. Hence, the meaning created in each transaction is not only relational but also institutionally situated due to expectations, norms, and values involved in deciding which experiences are desired (Garrison 2001; Quennerstedt 2013). Such expectations, norms, and values can be a teacher educator's communicated purpose of a PETE teaching event or the purposes to which the PSTs orient themselves in their activities (cf. Andersson, Garrison, and Östman 2018). Accordingly, PSTs learn how to privilege a certain practical epistemology (i.e., how to produce and reproduce knowledge through actions in an educational event). According to Dewey ([1938a] 1997), the purpose(s) directs and redirects people's actions and supports participants in acting intelligibly through a process of inquiry. Purposes are not fixed but are adjusted at every phase of the process of inquiry, thus allowing intelligent action by acting as plans that shape the course of events.

While purposes serve as guides or plans in and for an activity, Dewey defines inquiry as "the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole" (Dewey [1938b] 2013, 167). Inquiry is initiated from a requirement to resolve a physical need, emotional disharmony, or

cognitive doubt in an indeterminate situation (Biesta and Burbules 2003). To resolve this tension, an individual's actions become directed in various directions and for different purposes (Dewey [1938a] 1997). Some experience is immediate and not concerned with knowledge but more with memorising, ordering, and logic. It is only when encountering resistance in a situation, when noticing an indeterminate situation, that experience takes part in a process of inquiry and the participant makes meaning of the learning occasion (Andersson, Garrison, and Östman 2018). However, if for example subject matter or teaching methods are too foreign to the learner, in this case the PST, they are also beyond reach of the experience the learner already possesses (Dewey [1938a] 1997, 19). In Dewey's ([1910] 1997) words, there is a need for interaction between the near and the far in educative experience: "Too much of the easy and familiar gives no ground for inquiry; too much of the hard renders inquiry hopeless" (222). Indeterminate situations, also called *gaps*, are therefore seen as highly important to study in learning processes (Garrison 2001; Quennerstedt 2019; Wickman and Östman 2002b). In conclusion, learning occurs when the PSTs notice an indeterminate situation, a *gap* is opened, and *relations* are made in an *encounter* between what the PSTs already know and the new situation to attain the *purpose* of the learning occasion.

To analyse learning and meaning making in PETE, a practical epistemological analysis (PEA) is used. PEA is based on the work of John Dewey and the later works of Ludwig Wittgenstein (Wickman 2004; Wickman and Östman 2002a; Wickman and Östman 2002b) and is further described in the following section.

Practical epistemological analysis (PEA)

The analytical tool PEA has often been used to clarify mechanisms of learning through detailed, in situ studies of what individuals are able to learn. For understanding the complexity of learning occasions, PEA has proven to be particularly useful in producing knowledge about micro processes, situations, critical moments, and their significance in learning processes (Andersson 2019). Zooming in analytically on how language is used in making meaning in educational events has contributed with knowledge on learning on a micro-level. However, within the field of PE, PEA analytical tools have also fruitfully been used to examine patterns in pupils' meaning making in schools (e.g., Mattsson and Larsson 2021). In prevailing re-

search, a zoomed-out perspective of learning is used to be able to focus on patterns from comprehensive data related to how PSTs produce and reproduce knowledge in an entire subject didactics course (cf. Goodyear and Quennerstedt 2020). Four of the PEA concepts were used: purpose, gaps, relations, and encounters (table 1). The analytical process will be further developed in the data analysis section.

TABLE 1 *PEA analytical concepts*

<i>PEA concept</i>	<i>Description of concept</i>
Purpose	Ascertaining the purposes for the individuals' participation in a particular practice
Gaps	Identification of gaps or indeterminacies in knowledge, behaviours, interactions, and/or feelings
Relations	Identification of what an individual does to fill the gaps and how they do it
Encounters	Identification of what, whom, and concerning what individuals meet and engage with in the situation

To sum up, the aim of the study was to empirically explore, from a transactional approach, what happens in learning occasions when PSTs participate in a PETE subject matter course. The focus of the study was to explore PSTs as learners, and the research question that guided the study was as follows:

- How do PSTs produce and reproduce knowledge when participating in PETE?

Context

In Sweden, the subject matter areas treated during PETE are centrally decided, but the universities interpret and decide upon the actual content with great freedom. The prevailing syllabus for PE in compulsory and upper-secondary school can be described as divided into three main knowledge areas: movement, health and lifestyle, and outdoor life and activities (Swedish National Agency of Education 2011; Swedish National Agency of Education 2022). These main knowledge areas can be seen as having an influence on the PETE subject-matter courses at the university in question.

The subject matter course of 22.5 credits treated both subject matter and didactics (i.e., pedagogy with a focus on teaching and learning PE).

In curricular documents, an overarching aim for the course was identified as developing four similarly important qualifications for a PE teacher: teacher quality (including an analytical perspective and skills in leadership), didactical quality, subject matter knowledge, and movement capability. The lessons were different in some ways but showed similarities in other aspects. Lessons taking place in a gym, outdoors or an indoor swimming pool generally consisted of sporting activities such as racket sports, dancing, swimming, and gymnastics, but also of adapted physical activity, one canoeing and hiking excursion, and one skiing excursion including sleeping in bivouacs. Other lessons generally consisted of lectures on a selected topic or seminar sessions examining literature or PSTs' academic reports. In addition, a scientific methods module was included. Because of the COVID-19 pandemic, adjustments were made to the course. Lessons in the gym and the indoor swimming pool were often held in small groups of PSTs, and seminars and lectures were held online via Zoom.

Methodology

Data collection

From an interpretative stance, a qualitative research approach was used for the study. To be able to explore what happens in learning occasions in PETE, the author chose to collect data from participant observations. Context, people, and time were criteria for sampling (Hammersley and Atkinson 2019; Jeffrey and Troman 2004). Purposive sampling was chosen to allow a broad familiarisation and access to a specific rich context (Clark et al. 2021), resulting in the choice of one PE subject matter course given at one Swedish university because of the interdisciplinary content that is representative of all PE subject matter courses during PETE. The sampling resulted in a group consisting of 24 PSTs (11 female students and 13 male students). The study further included five PETE educators (two women and three men). The teacher educators were not included in the sample, but they participated in the encounters the PSTs had in PETE lessons, and therefore their results are reported.

Data was collected from February to May 2020 and the lessons that were chosen were representative of the content covered during the 22.5-credit course. In total, the empirical material resulted in 28 lesson observations (table 2), all lasting between 60 and 120 minutes. To avoid interfering and to keep the observed lessons as realistic as possible, no recordings were

made. Instead, the researcher closely shadowed the participants' actions. A semi-structured observation protocol was followed where time, participants, events, dialogues, and actions that stood out as particularly important due to the research interest were noted (Emerson, Fretz, and Shaw 2011). In writing field notes, the author focused on capturing detailed aspects of the transactions, including PSTs' verbal and nonverbal actions, where direct verbatim quotes were used along with sensory details such as gestures and facial expressions. In direct connection with the completed observation, the field notes were sorted and written up by the author. In total, the field notes resulted in 218 pages, varying between 3 and 18 pages per observed lesson.

TABLE 2 *Empirical material*

<i>Lesson content</i>	<i>Number of observa- tions</i>
Course introduction (course aim, content, assignments)	1
Quantitative research method	2
Adapted physical activity (lectures, sessions in the gym, school visits, literature seminar)	4
Volleyball/beach volleyball	2
Racket sports (badminton, table tennis, squash)	5
Seminar on outdoor education during wintertime	2
Curriculum and PE (writing a paper, giving peer feedback)	3
Gymnastics	1
Swimming	6
Seminar on PE and societal health discourses	1
Seminar on gender and PE	1
Lessons in total	28

Participants were informed, orally and in writing, of the study's aim and methodology and that they could withdraw their consent at any time. All participants signed written consent forms. Throughout the study, guidelines concerning anonymity and confidentiality stipulated by the Swedish Research Council (2017) were followed. All names in the findings section are fictitious. Further, to be mindful of relational ethics, the author engaged in reciprocity with participants (Tracy 2010). This meant being transparent in taking field notes and respecting participants who showed that they wanted to distance themselves. At the time of conducting the study, the author had previously been a PE teacher in compulsory school

for seventeen years and was now teaching general didactics within teacher education. The author had not been a teacher to the participants. This positioning was perceived as helpful in gaining access to the field and in creating credibility to conduct meaningful and trustworthy research. The field notes were complemented with self-reflective notes where the author introspectively scrutinized feelings and sensemaking to increase transparency and to be mindful of subjective experiences (Emerson, Fretz, and Shaw 2011). Due to the limited sample, criticism can be raised regarding the issue of generalisability. However, when teaching and learning are seen as based on an understanding of the learner, an understanding that varies from one educational context to another, there is no reason to believe in definite universal teaching sequences. Rather, the findings of the study are valuable across a variety of PETE contexts because readers can vicariously recognise and reflect on the PSTs' learning processes (cf. Tracy 2010).

Data analysis

In the following, the analytical process cannot be seen as linear but is rather meant to move back and forth between the data. However, in this study, a combination of inductive and deductive strategies of analysis was chosen (cf. Clark et al. 2021), and is described below in three phases.

Phase one was to read all transcripts inductively several times to obtain an overarching view of the events that occurred during the learning occasions. During this phase, memos and key words about significant observations were written and these codes were then further reviewed in relation to the research question (Clark et al. 2021; Miles, Huberman, and Saldaña 2014).

The second phase was to use the four chosen PEA concepts deductively in analysing each transcript one by one: The first step of PEA was to identify the *purpose(s)* of the PSTs' participation in each observed lesson. This was explored by analysing the direction of curriculum documents and teacher educators and PSTs' verbal and nonverbal actions, keeping in mind that the purpose(s) can differ between individuals and also change and take new directions. The second step was to identify *gaps* or signs of problems that the PSTs faced when they were supposed to do, understand, or learn something. Examples of gaps were observed when the PSTs received instructions in an exercise and responded with a counter-question or guessed the answer to a question posed by the teacher educator or peers. In addition, nonverbal expressions characterising a gap being opened

could be seen in the form of a sigh or other signs of hesitation, frustration, or doubt. The third step in PEA was to look for ways the PSTs handled the gaps by trying out and experiencing the consequences of actions (i.e., construing *relations* between their knowledge and a new experience in the learning occasion). However, sometimes the PSTs did not move on in the situation; the problem remained unsolved and the gap lingered. Finally, in the fourth step, PEA proceeded with identifying the *encounters*, issues, or questions the PSTs engaged with connected to identified gaps in the lesson. The encounters were identified in the shape of transactions involving peers, teacher educators, exercises, assignments, and material, but also with discourses and traditions.

During this phase, to deepen understanding and encourage trustworthiness, two external research colleagues with vast experience in coding qualitative data were involved as critical friends (cf. Smith and McGannon 2018; Tracy 2010). Each researcher independently coded transcripts from three observations randomly selected by the author. A meeting was then held to compare annotations, and to discuss different alternatives, views and arguments whereupon a collective agreement was reached.

In the third phase, after revision of the analysis of all transcripts, the PEA concepts were coded on Post-it notes of various colours and thereafter organised in relation to each other. To provide the opportunity to look at a comprehensive set of data, a zoomed-out perspective on learning was used, focusing on identifying patterns across all observation transcripts in the study that illustrated learning processes in PETE. Given the importance of inquiry in learning, gaps were put in the foreground in this phase of the data analysis. After clustering, comparison and contrast of the identified gaps (cf. Miles, Huberman, and Saldaña 2014), four minor themes of what happened in the observed learning occasions were found. The minor themes could further be merged into major themes and the relation between the themes and codes can be seen in table 3.

The themes should be considered patterns of the indeterminate situations that occurred in complex learning occasions rather than categories with clear limits, and they are elaborated upon below.

TABLE 3 Themes

<i>Sign of gaps</i>	<i>Examples from data</i>	<i>Minor themes</i>	<i>Major themes</i>
Frustration when perceiving failure	- <i>It is not possible!</i> (PST commenting on a perceived failed cart wheel)		
Disappointment when perceiving failure	- Oh, no! That was not an instructive serve.. (PST commenting on a perceived failed volleyball serve)		
Joking about the situation	- <i>I think I have to big lats to do this!</i> (PST trying to crawl)	1.1 The perception of the PE teacher as skilled in movements	1. Indeterminate situations connected to PSTs developing movement capability
A passive approach, hesitating	- PSTs staying last in the line when having failed the previous endeavours to learn the butterfly stroke		
Taking a position of requiring feedback	- PSTs being solely a receiver when being instructed to give peer feedback in table tennis		
Asking questions about how to perform a sports technique	- <i>Is it okay to close your hand?</i> (PST asking the TE when practising the volleyball serve)	1.2 Learning subject matter as isolated sports techniques	
Questioning the need of being capable of performing specific techniques	- Do a PE teacher need these skills?(PST asking the TE when talking about a gymnastics exercise during course introduction)		
Asking questions about problems PE teachers can face in their everyday work	- <i>How do you plan lessons that make it possible to assess pupils' movement capability?</i> (PST asking the TE during a seminar on curriculum and PE)		
Asking for hands-on tips on how to act	- <i>How do you name variations in function?</i> (PST asking the TE during a lecture about adapted physical activity)	2.1 Learning PE teacher skills and tricks	2. Indeterminate situations connected to developing a teacher's perspective
Asking questions within seminars treating critical perspectives on PE	- <i>Which pupils will benefit from this health project?</i> (PST raising a question to peers during a seminar on societal health discourses)		
Asking counter-questions in didactical discussions arranged by the TE	- <i>The cultural aspect of teaching volleyball... and this is for white, middle class men?</i> (PST in a discussion about the saying in the syllabus to pass on a cultural heritage)	2.2 Adopting a critical teaching perspective	

Findings

In this section, in relation to each theme, first a broader, zoomed-out, perspective of indeterminate situations in the subject didactics course is reported on. Second, how the PSTs handled these indeterminate situations is described in relation to chosen excerpts from the data.

PSTs developing movement capability

In a majority of the observations that took place in the gym or swimming pool, the teacher educator expressed a two-fold purpose: to develop both the PSTs' movement capability and their didactical competence. For example, the PSTs were given the task of giving peer feedback on smash strike techniques in badminton or of performing a cartwheel and then discussing possible difficulties to achieve a pupil's perspective on cartwheeling. However, most indeterminate situations were discernible when PSTs engaged in developing movement capability.

A recurring action that could be observed during PETE lessons was PSTs verbally expressing frustration or disappointment when they perceive failure in their movement capability, and these gaps seemed connected to *the perception of the PE teacher as skilled in movements*. Gaps were visible in utterances such as "I cannot do this" (Carla, PST, when practising cartwheeling), or, "I am stuck. I seem unable to move forward!" (Filip, PST, when practising the crawl technique in swimming). Gaps could also be seen when PSTs took on a passive approach, which included silence, and/or hesitant movement patterns such as avoiding handling the difficulty by staying in the background and thereby avoiding an opportunity to practice. In addition, passivity could be seen in actions where PSTs solely took the position of requiring feedback rather than also being competent to give feedback to peers.

Furthermore, a significant portion of the transactions that engaged a majority of the PSTs in indeterminate situations involved *learning subject matter as isolated sports techniques*. Such gaps were often expressed in questions asked, both between peers and by PSTs to teacher educators, such as, "What should I think about when blocking?" (Mikael, PST, addressing the teacher educator when practising beach volleyball).

Only a few gaps connected to developing movement capability could be discerned during observed seminars and lectures. These gaps were visible in occasional questions PSTs posed, such as, "Why do we [as PE teachers]

need to learn rotations?” (Ellen, PST, addressing the teacher educator during the course introduction). Because a majority of the gaps connected to PSTs developing movement capability were noticed in lessons in the gym or the indoor swimming pool, how and when these gaps become visible is illustrated with an excerpt from a table tennis lesson:

The teacher educator, Erik, had a gathering at the beginning of the lesson and discussed didactical aspects to consider when teaching racket sports in schools. Erik emphasised that the lesson aimed to practice the stroke movement. The excerpt below begins when the group has started practising high strokes on each other in pairs with the floor as the playing court.

Excerpt 1

[David and Ella are playing together]

Ella: Oh, no! The first one was good. Oh my God, so bad! [She misses the ball]

[David and Ella keep practicing the stroke movement. They are silent and both of them strike the ball with increasing power.]

Erik: We stop here! [He catches the group's attention]. I will try to explain it in words. We shall try to play nicely, play together, not against each other. Try to hit the ball from the bottom up. [The PSTs scatter throughout the gym and start play again with an increased focus on what Erik just told them.]

Ella: It hit the edge of the racket. It is hard to make the top spin due to the air resistance.

[Erik approaches David and Ella, who are now striking lobbs to each other.]

Erik: That is a good movement!

(...)

[Erik gives the PSTs instructions for the next exercise.]

Erik: I have put chalks on the tables. I want you to create a game for cooperation that gives good opportunities to succeed. Think about how to, not win, but... How you can know that you have succeeded and challenged yourself.

[Victoria and Helena stand beside a table, holding their chalk, and talk about a swimming test they are about to do in a couple of weeks. After some time, they begin drawing but do not try out their game by playing.]

[Erik gathers the PSTs]

Erik: Tell me about your invented game!

Helena: We have drawn an area in the corners, which you should not hit because then the game could be too hard.

[Other pairs also tell of their invented games.]

Erik: Good thoughts! We are focusing a bit more now on table tennis. If you want to create a game that resembles table tennis, then maybe you want to hit these corridors on the table, and maybe those hits could give you points. But you all have kept the thought of precision in mind, good! Play together for a while now and see how you can develop your table tennis game!

[Victoria and Helena talk about how to develop their game, but they do not play. They use their chalk and draw many lines on the table.]

Erik: Are you still experimenting?

Victoria: Yes. [The PSTs laugh together.]

[Victoria and Helena strike the ball but do not succeed in striking it over the net more than a couple of times.]

Victoria: Well, if you imagine that you are a beginner..

[Victoria and Helena stop playing and begin to talk about the swimming test again.]

In this encounter, relations between what the PSTs already know about sports activities and the new in the situation, learning movements as PE subject matter, are construed by a contextualisation of table tennis as a part of the school subject of PE. For example, Erik emphasised expressions such as, “Remember to play together,” or, “Create a game for cooperation that gives good opportunities to succeed.” For the PSTs, in these transactions, Erik’s choice of words becomes important to the direction of their learning processes. David and Ella begin practising their forehand stroke with an ambition to strike the ball with power rather than precision, and Ella expresses frustration when missing the ball. Their actions signal a competition-like element rather than the educational aspects of learning this movement. With Erik’s reminder to play together, the purpose of David and Ella’s participation in this part of the lesson changed to focus on cooperative learning and their earlier experience of table tennis as competition took on a differentiated meaning.

However, other gaps where the PSTs showed signs of experiencing a stressful situation and negative feelings due to not being skilled in movements often lingered. For example, in the table tennis lesson where Helena and Victoria seemed to notice a gap when Erik gave instructions to create a game that would enable success, they drew on a perspective of being a beginner in their dialogue and the table tennis game they created, a game they did not want to be “too hard”. Helena and Victoria seemed to have difficulties engaging in the exercise due to a lack of the movement capability needed for embodied exploration of different didactical adjustments. Instead, they talked about forthcoming assignments, took a passive ap-

proach, and seemed not to move forward with the exercise. A similar way of handling indeterminate situations could recurrently be seen in other learning occasions where the PSTs faced situations in which they perceived themselves as incapable of performing the ‘right’ movement.

PSTs developing a teacher’s perspective

In other encounters, in seminar sessions, and in lectures, the purpose expressed by teacher educators was to challenge, develop, and broaden the PSTs’ perspectives on PE and PE teaching.

Many indeterminate situations connected to developing a teacher’s perspective that were visibly noticed by the PSTs referred to problems that PE teachers can face in their everyday work. Such issues were often presented by teacher educators during lectures or were encountered in the literature. For example, one encounter that created many gaps occurred in lectures concerning adapted physical ability. PSTs often proposed questions that included the teacher educator’s personal experience and perspective; for example, “How did you communicate the adaptations in teaching you made to your pupils?” (Anton, PST, addressing the teacher educator during a lecture on adapted physical activity). However, gaps connected to developing a teacher’s perspective were also at times visible in lessons in the gym. The gaps could be noticed in discussions at the end of the lessons where the teacher educator summed up the lesson and asked the PSTs to reflect upon the exercises they had done that day. One example of such a reflection by a PST is, “If you are teaching volleyball in seventh grade, how many lessons is it reasonable to plan for?” (David, addressing the teacher educator during a beach volleyball lesson). Because the kinds of issues that engaged the PSTs concerned hands-on tips on how to act, talk, and handle concrete situations as a PE teacher, the purpose of developing a teacher’s perspective could be interpreted as *learning PE teaching skills and tricks*.

In seminars, in turn, PSTs were generally instructed to prepare for joint discussion and further participate in discussions raised by peers to achieve a passing grade. The encounters in which gaps became visible often included seminar content that concerned various issues connected to adopting critical perspectives on PE teaching such as diversity, ability, and equality. “Are all the pupils given the same possibility to participate in these PE lessons if you teach soccer ankle shots?” (Anna, PST, addressing a peer when giving peer review on a curriculum assignment) is one example of the questions PSTs raised. Occasionally, a few gaps of this nature could

also be seen in lessons in the gym and the indoor swimming pool when the teacher educator asked the PSTs targeted questions or engaged the PSTs in didactical discussions. For example when Lisa (teacher educator) addressed a group of PSTs during instructions in a swimming lesson, she said, “You have to remember that pupils can be particularly sensitive about participating in swimming lessons.” In the discussion that followed, the PSTs posed several counter-questions on ways teaching can be adapted in general, thus showing signs of an indeterminate situation in which they were challenged to *adopt a critical teaching perspective*.

Because many of the gaps connected to developing a teacher’s perspective were noticed in seminars, how and when these gaps become visible is illustrated in a seminar on PE and gender: The PSTs read three peer-reviewed articles, and the excerpt below begins when Lisa (teacher educator) has repeated the criteria for a passing grade.

Excerpt 2

Elias: Girls and boys have different rules to pass as ‘normal.’ [He makes air quote signs with his fingers to let his peers know he meant *so-called normal*]. I will give you a question to discuss right away. In this article, they talk about dancing as traditional activity. Should you start to talk in terms of leader and follower in dancing, rather than boy and girl?

Anton: Why not? If you have problems due to heteronormativity, that girls should be girly and boys should be boyish. It would be something easy to do.

Filip: Hmm... And also, this competition that we do not want to have too much of... If I have understood the texts, if you exclude the competition, there will not be that much aggressiveness?

Elias: I had that as one of my questions, too. If you only focus on individual competence....

Carla: If you could transform the games somehow so that there is not as much competition....

Elias: Teaching games for understanding, which I have studied, focuses on more kinds of made-up rules to get more cooperation, strategy, and stuff.

Mikael: Yes. If you go to the steering documents... If you have in mind the phenomenon that PE teachers bring what they have experienced themselves during PE, and therefore it all keeps on being as it always has been. This article talks about status and that it is important to get the pupils with status on your team, and also about power relations. As a human, it is important to feel that you are liked of course, but if you do as we did in our last assignment... It is important to go back to... what the purpose is here and proceed from that.

Hanna: My question is, how can you work to get away from heteronormativity in schools?

Elias - It is tough.

Hanna - Yes, it is difficult.

(...)

Maja: I think that there has been a lot of development in society in the last few years, and this article is published in 2007. If I would talk in terms of boy-girl in dancing lessons with my pupils, I think that there would be those who would protest.

The dialogue above shows the PSTs drawing upon their future role as the PE teacher facing the dilemmas presented in their discussions. In this seminar, there are examples of how PSTs use experiences made in PETE to make meaning of the issues encountered in literature. This can be seen when Carla, Elias, and Mikael construed relations between what they already know and new experiences related to the theme of gender and PE by reflecting upon how competitive elements in PE risk excluding pupils. Carla and Elias used concepts learned in, for example, the table tennis lesson, where the PSTs had been assigned the task of creating a noncompetitive, cooperative game. Mikael, in turn, discussed power relations in PE and showed he had picked up arguments from an earlier assignment about curricular work when he highlighted the importance of proceeding from a purpose in teaching. However, the PSTs also signalled that they found construing relations difficult, for example, when Maja expressed alienation from the literature based on the argument that the research they had discussed was old and that much has changed since the study was conducted. In addition, it can be seen when Hanna returned to the issue of how one works with heteronormativity in schools. An extended hesitation could be discerned in these indeterminate situations because the PSTs seemed to search for the correct answer but failed to come to a solution. The questions raised in this seminar were discussed for a while, and then the PSTs moved on to the next prepared issue to earn a passing grade in the course. The gaps thus lingered in the end, and the PSTs did not move on in the discussion. As a result, the PSTs signalled they had difficulties in filling gaps connected to developing a teacher's perspective solely drawing on literature and/or prior experience.

Discussion

The aim of this study was to empirically explore, from a transactional approach, what happens in learning occasions when preservice teachers (PSTs) participate in a physical education teacher education (PETE) subject matter course. The findings illustrate how knowledge is produced and reproduced in complex educational encounters experienced by PSTs. Thus, the study contributes to an understanding of PSTs as learners and shows patterns in the ways PSTs learn to privilege certain norms, values, and knowledge.

One of the most significant findings was that indeterminate situations the PSTs noticed differed between two types of staged encounters which include transactions taking place within 1) seminars and lectures and 2) lessons in the gym or the indoor swimming pool. The PSTs did engage in joint discussions about norms and values in relation to an inclusive PE teaching at stake when reading literature on topics concerning future educational challenges as PE teachers. However, the PSTs seemed to have difficulties recognising how such norms and values have the potential to influence their future practice as teachers. Due to the PSTs' lack of teaching experience and to seminars being exam sessions, they could not be supported by teacher educators with teaching narratives or by contextualising concepts in making sense of these learning occasions. Dewey points out that words can be given meaning to an individual only when he has had experience of some situation to which these meanings are actually relevant (Dewey [1910] 1997, 176). This could be an example of how subject matter is too foreign to the learner and thus beyond the reach of the experience the PSTs already possessed (cf. Dewey [1938a] 1997, 19). Therefore, in seminars and lectures, gaps connected to adopting a critical teaching perspective were opened and, sometimes filled, but also often remain unfilled. In turn, activities during lessons in the gym and the indoor swimming pool were most often connected to PSTs developing movement capability. Even though the teacher educators' purpose for these learning occasions was two-fold (i.e., to develop both movement capability and didactic competence), gaps connected to issues about teaching and learning were seldom expressed in PSTs' actions. Possible explanations are that didactical issues in learning occasions did not create many uncertainties, or that gaps were instantly filled and were therefore not observable. Another explanation can be found in the signs of the PSTs' shared experience of sports. What is known (i.e., experience) often relates to the students' perception of learn-

ing PE of an embodied and practical character (cf. Andersson, Garrison, and Östman 2018). The findings show that when the PSTs experienced a situation in which they faced a physical need, emotional disharmony, or cognitive doubt, their response seemed dependent on their expectations of what should happen in various encounters as well as on their expectations of what knowledge counts as valid for a PE teacher. In that sense, the meaning created in explored transactions is not only individual and relational but institutionally situated due to expectations, norms, and values involved in deciding which experiences are desired (cf. Garrison 2001; Quennerstedt 2013). Dewey ([1910] 1997) highlights that “habitual uses and results of use have become so intimately read into the character of things that it is practically impossible to shut them out at will” (124). The PSTs’ order of habitually noticing gaps in the gym and the indoor swimming pool thus favoured the purpose of developing their movement capability rather than the purpose of developing their didactic competence. These findings concur with those of Maivorsdotter, Lundvall, and Quennerstedt (2014) when discussing the assertion that the PSTs’ main component for making sense of their experience during PETE lessons was to fulfil their purpose of being highly competent athletes and that they needed to do this before they could make sense of the purpose of developing as teachers.

Another significant finding shows that what happened in the explored PETE practice was continuous as well as changing. Continuity of experience, as described above, could be seen when the PSTs seemed to reproduce skills-oriented and performative discourses, which presumably resonated with their own previous experiences as pupils in PE. However, continuity could also be seen when experience from one learning occasion was used to make meaning in a later situation (cf. Dewey ([1938a] 1997). Although each lesson observation in the study represents a separate unit of analysis, continuity across encounters was clear when the PSTs related to prior experience in PETE. In turn, change was evident when new relations were construed to fill gaps. One of the most central encounters concerning the direction of the PSTs’ learning processes was the encounter with the teacher educator. The excerpts illustrate how new relations were construed when concepts and critical teaching perspectives were operationalised in staged encounters by teacher educators—for example, when movements were put into a didactic context in both seminars and in the gym.

Current findings clearly support the relevance of discussing PSTs’ development of educational notions of PE teacher professionalism

related to movement capability as subject content knowledge. An understanding of the PSTs' learning processes further contributes to an understanding of why PETE has difficulties in challenging the PSTs' perceptions of PE. Following Dewey, the findings point to an important aspect of how elements in PETE characterised by a theory–practice dualism seem to contribute to certain processes of inquiry but not others. If PSTs are mainly engaging in actions and reflections connected to technical and organizational aspects of movement capability when in the gym, and if questions about who is benefited and/or excluded in PE teaching are mainly considered theoretical concerns, there is a risk that deeper critical reflections regarding social, political, and cultural issues are overshadowed in PETE (cf. Reynolds 2011). Makopoulou and Thomas (2016) argue that a key challenge for today's teacher education is to support and prepare prospective teachers to make PE learning meaningful and relevant for all, particularly those pupils "most vulnerable to exclusionary pressures" (473). They further highlight that such knowledge needs to be grounded in both robust research and the prospective teachers' understandings, perspectives, questions, and practices. Accordingly, an important question for PETE should be how learning occasions with the purpose of developing a critical teaching perspective can be challenging and yet still within reach for the PSTs' prior experience. Because data collection, considering length and frequency, was designed to capture the dynamics of people, time, contexts, and processes, the findings show more than a snapshot of PSTs' participation in PETE. As pointed out by Wickman (2004), a new habit has to be slowly built from old habits of action. The more zoomed-out perspective on learning enabled an understanding of the relationship between continuity and change, as well as between the near and the far, in learning processes (cf. Dewey [1910] 1997).

Conclusion

This study adds to the knowledge about how PSTs produce and reproduce knowledge in PETE by showing how learning has to build on what individuals already know at the same time as the educational events challenge the PSTs' understanding of PE. The importance of the teacher educator for the PSTs and the possibilities for learn-

ing in carefully staged encounters within PETE is highlighted. Accordingly, the findings suggest that teacher educators need to draw more coherent and relevant connections for PSTs between their experiences of PE, PETE, and literature, for example. Furthermore, teacher educators should be more intentional about integrating theoretical and practical knowledge into *both* the gym and lectures/seminars. Engaging in more reflective pedagogies is crucial for PETE experience to be cumulative and educational. In future research, there is a need to discover in more depth what and whom the PSTs encounter when they are engaged in inquiry. Therefore, to be able to deepen the knowledge on continuity and change in the PSTs' learning processes, it would be interesting to further investigate various encounters in PETE over time.

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