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Re-thinking pedagogical content knowledge for physical education teachers – implications for physical education teacher education

Erik Backman and Dean M. Barker

ABSTRACT

Background: In this conceptual paper, we contribute to the discussion of pedagogical content knowledge (PCK) in physical education and physical education teacher education (PETE). There are two main limitations in the work inspired by Shulman’s [1987. “Knowledge and Teaching: Foundations of the New Reform.” Harvard Educational Review 57 (1): 1–21] concepts content knowledge (CK) and PCK. First, CK is exclusively interpreted as knowledge in and about movement, and excludes knowledge through movement. Second, contemporary understandings of CK and PCK have been mainly from a behaviour analytic perspective. By only adopting a behavioural perspective of CK, i.e. a perspective which aims to change students’ behaviours without necessarily changing knowledge or understanding, pre-service teachers are unlikely to reflect on context and culture or how these affect the students with whom they will work.

Purpose: The purpose of this paper is to add a new perspective to the contemporary discussion of PCK in physical education and PETE through elaborating on how PCK could be conceptualised ‘phronetically’. We believe that contextual and situational foci of a phronetic approach constitute an important dimension of teacher knowledge, and that this dimension is not captured or made visible by behaviour analytic discourse of PCK in movement cultures.


Results: We outline four major assumptions made about PCK in the behaviour analytic research on physical education and PETE: 1. Physical education teachers must know how to perform activities with the correct technique, know the tactics and have knowledge about rules and etiquette; 2. Physical education teachers must know how to detect errors and design task progressions. 3. Physical education teachers must know how to select and modify appropriate tasks as well as give feedback. 4. Physical education teachers’ level of CK and PCK can be quantitatively measured.

Conclusions: From a phronetic perspective, we suggest that PCK could also involve: contextual characteristics for ‘new’ and integrative movement cultures; interpretation of students’ actions; identification and action on diversity during physical education teaching; development of
a sensitivity for morally ‘right’ actions; and management of uncertainty involved in physical education teaching.

Introduction

Content Knowledge (CK) and Pedagogical Content Knowledge (PCK) have been intensively discussed in the scholarship of physical education and Physical Education Teacher Education (PETE) (Capel et al. 2011; Herold and Waring 2018; Iserbyt, Ward, and Li 2017; Tinning 2010; Ward and Ayvazo 2016). We see two limitations in the discussions of CK- and PCK-discourse in physical education and PETE. First, CK in this discourse is almost exclusively interpreted as knowledge in and about movement (Arnold 1979). Knowledge through movement, knowledge that might be gained from disciplines such as exercise physiology, sociology of sport, biomechanics, history of sport, motor control and sport pedagogy – sub-disciplines that are part of many PETE programmes – is very rarely considered as CK for physical education teachers. Second, contemporary understandings of CK and PCK in physical education and PETE have been largely behavioural and focused on measuring and testing CK and its effects on PCK (Iserbyt, Ward, and Li 2017; Kim et al. 2015; Ward and Ayvazo 2016). Culturally-situated aspects of PCK have to a large extent been ignored, a tendency which is also visible in research on teacher education in other subjects (Berry, Depaepe, and van Driel 2016; Depaepe, Verschaffel, and Kelchtermans 2013). From our perspective as socially critical constructivist researchers we believe that by only adopting a behavioural perspective of CK, i.e. a perspective which aims to change students’ behaviours without necessarily changing knowledge or practices, pre-service teachers are unlikely to reflect on context and culture or how these affect the students with whom they will work.

In this conceptual paper, we respond to the limitations identified above and contribute to a discussion initiated by Ward and Ayvazo (2016) concerning the conceptualisation of PCK in physical education and PETE, and its relationship to CK. We suggest that some important aspects of physical education teacher knowledge are rendered invisible in behaviour analytic discussions of PCK for physical education teachers. Drawing on the work of Dunne (1997) and Jones (2017), the specific aim of this paper is to add a new perspective to the contemporary discussion of PCK in physical education and PETE through elaborating on how PCK could be conceptualised ‘phronetically’. We believe that contextual and situational foci of a phronetic approach constitute an important dimension of teacher knowledge, and that this dimension is not captured or made visible by behaviour analytic perspectives of PCK in movement cultures. We further suggest that this dimension can help to broaden teachers’ and teacher educators’ views on competent teaching in physical education. For the conceptual task of expanding our understanding of PCK, we have been inspired by Thomas (2007), Shoemaker, Tankard, and Lasorsa (2004), and Whetten (1989) and their ideas of building theory through borrowing, reflective thinking, and metaphors.

Analytical approach

Given that PCK constitutes an aspect of educational theory, this paper is theoretically-driven. There are different ways of thinking about and developing theory and different scientific fields have different traditions for developing theory. In the natural sciences, empirical material is often seen as a necessary, although not sufficient, element of theory development. From this perspective, a rigorous, systematic method is necessary. In the social sciences, the picture has been less distinct. Here, we want to draw attention to three social scientific principles of theory development that proved useful when working with PCK. These principles relate to reflectiveness, metaphorical thinking, and borrowing.
Several social scientists have pointed to the importance of adopting a reflective attitude to the theories with which one is using as a framework to consider a particular phenomenon (e.g. Baker 1990). Specifically, the idea of acknowledging that a theory is only one way to view the world and that there are others has been presented as a crucial aspect of developing new ideas. Thomas (2007) notes that Michel Foucault (1995), an advocate of reflective approaches to research, claimed that existing theories should be played with, theatricalised, and importantly, that they should be seen as the starting point of further brainstorming rather than endpoints of thinking. In this respect and in relation to our current task, rather than ask how we can use CK/PCK theory to explain certain aspects of physical education pedagogy we want to ask, what else can we explain if we are willing to play with or question some of the assumptions involved in CK/PCK theory?

A second principle relates to metaphorical thinking. Metaphors have received quite a lot of attention in social scientific scholarship, with a number of theorists noting that explanations – both scientific and popular – are often underpinned by metaphors or analogies (Alvesson and Sköldberg 2000; Ricoeur 1978; see also Barker, Bergentoft and Nyberg [2017] in the context of physical education). Goffman (1959) for example, made use of a dramaturgy metaphor in developing theory concerning everyday interactions. Foucault (1995) employed the idea of the panopticon, a special type of prison, to describe how people control their actions. In order to develop social scientific explanations, scholars have proposed that the ‘theory builder’ needs to recognise these underlying metaphors, identify the conceptual consequences of using those metaphors to explain phenomena, and then finally, seek the limits of those metaphors (Shoemaker, Tankard, and Lasorsa 2004).

The third principle relates to borrowing. Whetten (1989) pointed out that theory tends to be developed when theorists move from one ‘field’ to another and explore how one set of ideas or explanations works in another field. A relatively large-scale example is the propagation of game theory in the twentieth century, beginning in mathematical economics but finding utility in fields as diverse as philosophy and political science (Leonard 2010). Whetten suggests that, ‘theory development commonly involves borrowing a perspective from other fields, which encourages altering our metaphors and gestalts in ways that challenge the underlying rationales supporting accepted theories’ (1989, 493). He also claims borrowing is more common than we might expect and that it is frequently the cause of theoretical advances.

While principles related to reflection, metaphorical thinking, and borrowing can help us to build theory, they also help us to consider what theory omits, ignores, or addresses only superficially. In the next section, we apply these principles in a consideration of CK and PCK. We highlight what we see are some oversights while recognising that no theory can ever be entirely comprehensive.

**Pedagogical content knowledge**

**Definitions**

Given our aim is to add a new perspective to the contemporary discussion of PCK in physical education and PETE through elaborating on how PCK could be conceptualised ‘phronetically’, it makes sense to begin by outlining existing definitions of PCK. Literature contains different ways of thinking about PCK. Shulman identified PCK as one of seven categories of teacher knowledge and described it as ‘that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding’ (1987, 8). Although Shulman’s (1987) definition of PCK became influential, it also met a great deal of critique. For example, Marks (1990) argued that PCK had ‘fuzzy’ boundaries. Grossman (1990) claimed that PCK was narrowly conceptualised and suggested that curriculum knowledge needed to be included. Another critique of Shulman’s conceptualisation of PCK was towards the lack of empirical grounding (Ball, Thames, and Phelps 2008). Drawing on studies measuring PCK in mathematics through standardised tests, Ball, Thames, and Phelps (2008) divided PCK into smaller conceptual units such as: knowledge of content and teaching (KCT), knowledge of content and students (KCS) and knowledge of content and curriculum (KCC).
A number of scholars in the context of physical education have used Ball, Thames, and Phelps’ (2008) model to understand CK and PCK (e.g. Iserbyt, Ward, and Li 2017; Ward 2014; Ward and Ayvazo 2016). Ward and Ayvazo suggest that KCT refers to a teacher’s ‘selection of an instructional model’, while KCS refers to a teacher’s ‘understanding of her students from past experience with them and other students’, and KCC refers to ‘decisions that a teacher makes about what and when to teach specific content’ (2016, 196). Several studies show that improvements on different forms of CK (i.e. CCK and SCK) interrelate positively with PCK and student performance (Ayvazo and Ward 2011; Iserbyt, Ward, and Li 2017; Ward et al. 2015). To summarise, research in which PCK in physical education and PETE have been addressed builds predominantly on a behaviourist perspective. This research have focused on the meaning of CK for PCK, and have involved measuring stronger and weaker knowledge areas. Investigations of culturally-situated aspects of teaching and educational contexts, in which knowing-to-act or knowing-to-teach is defined and situated within a particular context (Berry, Depaepe, and van Driel 2016; Depaepe, Verschaffel, and Kelchtermans 2013), are relatively rare.

Assumptions of PCK in physical education and PETE

Having briefly introduced different definitions, we want to look in more depth at how PCK has been conceptualised. Early PCK literature displayed some variation. A behaviour analytic tradition, based on the work of Siedentop and others, developed during the 1990s (Schempp et al. 1998; Siedentop and Eldar 1989; Siedentop and Tannehill 2000). This tradition was however, complemented by research using situated learning theory (Chen and Rovegno 2000; McCaughtry and Rovegno 2003; Rovegno 1995) and by the French didactic tradition (Amade-Escot 2000a, 2000b). Today, behaviour analytic perspectives are more dominant in discussions of CK and PCK in physical education and PETE. From having been mainly US-based, behaviour analytic work on CK and PCK have spread to countries such as China (e.g. He, Ward, and Wang 2018) and Belgium (e.g. Iserbyt, Ward, and Li 2017). More specifically, this type of research investigates: teachers’ representations of content; instructional tasks that are used to teach the content; and adaptations of those tasks to student needs (e.g. Ayvazo and Ward 2011; Iserbyt, Ward, and Li 2017). For more details of the conceptualisation of PCK, see Ward and Ayvazo (2016).

In the remainder of this section, we want to outline four major assumptions made in research about PCK in physical education and PETE in behaviour analytic research. Our ambition here is to summarise the major findings of this research and to discuss what we, from a socially critical constructivist perspective, see as its strengths and limitations. As CK and PCK are strongly interconnected, and often discussed in the same studies, we have included behaviour analytic work focusing both CK and PCK in our review. Initially, Ward and Ayvazo’s (2016) review of literature of PCK in physical education was our point of departure. Inspired by their paper, we then used two strategies in our search for literature of PCK in physical education and PETE. One was ‘snowballing’, i.e. going through reference lists of referred papers and trying to identify literature central to the topic. The other was a traditional literature search through the data base ERIC(EBSCO) using the keywords ‘pedagogical content knowledge’, ‘content knowledge’, ‘physical education’ and ‘physical education teacher education’ in different combinations. Finally, we kept 18 papers and chapters that we thought were central to our review. The assumptions presented are not mutually exclusive. Rather, many of the examples referred to are based on several of the assumptions constructed from the literature.

Assumption one: the teacher needs to be able to perform activities with the correct technique, know the tactics and have knowledge about rules and etiquette in order to have PCK

Early work in behaviour analytic research on CK and PCK in physical education (see e.g. Siedentop and Eldar 1989) builds on Shulman’s (1987) perspective of teacher knowledge, while more recent work (see e.g. Ward 2009) builds on Ball, Thames, and Phelps (2008). In both early and newer work, it is strongly emphasised that teachers need to be able to physically perform sport skills,
know the tactics of the activity and have knowledge about rules and etiquette in order to develop PCK. Ward (2009) suggests that CCK is one part of CK that is needed for teaching physical education. He defines CCK as techniques (e.g. the physical performance of a serve in volleyball), tactics (e.g. knowledge of how to use space on the volleyball-court), as well as rules and etiquette (e.g. knowledge that it is foul to touch the net in volleyball if it disturbs the opponent team). While techniques and tactics can be seen as examples of knowledge about movement, rules and etiquette can be seen as examples of knowledge about movement (Arnold 1979). Drawing on Ward’s (2009) conceptualisation of CCK, the physical performance of sport skills as well as knowledge about rules and etiquette, and the effect they have on PCK, have been measured in several studies (Iserbyt, Ward, and Martens 2016; Iserbyt, Ward, and Li 2017; Ward et al. 2015; Ward, Tsuda, et al. 2018). As a part of CCK, correct demonstrations by the teacher are assumed to be vital for students’ understanding and learning of CK (Iserbyt, Ward, and Li 2017; Schempp et al. 1998; Siedentop and Eldar 1989). Accordingly, pre-service teachers’ lack of knowledge concerning movement techniques and rules is seen as highly problematic (Kim et al. 2015; Ward et al. 2012).

Assumption two: the teacher needs to be able to detect errors and design task progressions in order to have PCK

Recently, investigations of CK and PCK in physical education from a behaviourist perspective have highlighted SCK as an important but often neglected part of CK for pre-service teachers and physical education teachers (Dervent et al. 2018; Kim et al. 2015; Ward et al. 2015; Ward, Tsuda, et al. 2018, Ward, He, et al. 2018). According to Ward (2009), SCK is knowledge of students’ errors (e.g. identifying wrong technique when passing in volleyball), instructional tasks (e.g. task progressions for learning how to perform a serve in volleyball) and representations (e.g. how to present task progressions to the students). The above examples of SCK can be seen as knowledge about movement (Arnold 1979). Ayvazo and Ward (2011) expand on SCK, suggesting that,

… an expert in teaching tennis to fourth grade students may identify a wrong grip and immediately provide a correction before the error escalates. A non-expert may not even notice an incorrect grip and continue to remediate the contact with the ball. (Ayvazo and Ward 2011, 675)

SCK is different from CCK in the sense that it is not necessarily learnt through performing the activity but must be specifically taught. It is also different from PCK in the sense that the context is assumed to be neutral (i.e. the knowledge is the same regardless of the pupils’ characteristics) when learning SCK (Iserbyt, Ward, and Li 2017; Ward, Tsuda, et al. 2018). Many physical education teachers have low levels of SCK and according to some scholars (Dervent et al. 2018; Ward, He, et al. 2018), it is difficult but not impossible to learn. The emphasis on being able to detect errors and design task progressions raises questions regarding the basis on which errors are identified and task progressions constructed.

Assumption three: the teacher needs to be able to select and modify appropriate tasks as well as give feedback in order to have PCK

Being an expert physical education teacher with mature PCK is not just a question of having high levels of CK. Several scholars have claimed that appropriate task selection, i.e. selecting tasks in relation to the characteristics and age of a group, is a vital component of PCK (Ayvazo and Ward 2011; Iserbyt, Ward, and Li 2017; McCaughtry and Rovegno 2003; Rovegno 1995; Schempp et al. 1998). Ayvazo and Ward propose that expert physical education teachers in their investigation knew ‘which tasks would work’ (2011, 676). Further, Iserbyt, Ward and Li argue that ‘expert teachers [had] fewer inappropriate tasks compared to non-experts’ (2017, 73). Again, we would suggest that some consideration of appropriateness is necessary. According to Iserbyt, Ward, and Li (2017), appropriateness of task selection should be measured in relation to students’ age, individual capabilities and fundamental principles of the sport. In an investigation by Ayvazo and Ward (2011), appropriateness of task modification was measured in relation to whether the students’ physical
performances were correct or incorrect. Drawing on the studies of Ayvazo and Ward (2011) and Iserbyt, Ward, and Li (2017), what is considered an appropriate or inappropriate task seems to be based on normative assumptions rather than the emerging result of teaching and learning practices.

Assumption four: the teacher’s level of movement CK and PCK can be quantitatively measured

A fourth and final assumption relating to PCK concerns testing and measurement. Iserbyt, Ward and Li claim that ‘there is a pressing need to demonstrate experimental relationships between CK and PCK’ and that finding ‘operational and thus replicable measures of CK and PCK’ is necessary (2017, 74). With regards to indicators of CCK, physical performances as well as answers of skill technique, tactics and rules in different sports have been measured in terms of whether they are correct, partially correct or incorrect. The validity of these tests is claimed to be high due to the involvement of experts from physical education as well as from elite sports (He, Ward, and Wang 2018; Iserbyt, Ward, and Martens 2016; Iserbyt, Ward, and Li 2017; Ward et al. 2015). With regards to SCK, the progression of instructional tasks, and these representations and adaptations have been measured and coded into four categories ranging from mature and appropriate to immature and inappropriate (Iserbyt, Ward, and Martens 2016; Iserbyt, Ward, and Li 2017). Recently, content maps, i.e. a graphic organiser of content, and models for index-calculation have also been developed for assessing appropriateness of instructional tasks and task progressions (Dervent et al. 2018; Ward, Tsuda, et al. 2018; Ward, He, et al. 2018). Further, error detection and correction, another indicator of SCK, is measured in terms of whether these are discovered during student performance. Physical education teachers’ PCK has also been measured, often with the hypothesis that changes in CK will lead to changes in PCK, an idea that has been confirmed in the results of several studies (Ayvazo and Ward 2011; Iserbyt, Ward, and Martens 2016; Iserbyt, Ward, and Li 2017; Ward et al. 2015). Maturity and adaptation of tasks given to students are indicators of PCK in these studies. The appropriateness of the tasks has been assessed in relation to systems for modifying tasks and physical education content (Rink 2010; Siedentop and Tannehill 2000). Another indicator of PCK is the correctness of student performance. Measurements of CK as well as of PCK are often calculated by dividing the number of correct/appropriate performances/adaptations by the total number of efforts (Ayvazo and Ward 2011; Iserbyt, Ward, and Martens 2016; Iserbyt, Ward, and Li 2017). The idea of quantitative measurement of CK and PCK makes comparison, evaluation and assessment possible and helps to make a case for the inclusion of more CK in PETE courses. However, it also raises questions with regards to inclusion and exclusion when the teaching abilities are transformed into numbers. What conceptualisation of movement learning for example, do we promote when we label some movements as correct and some as incorrect?

In the introduction, we proposed that there are two main limitations in the behaviour analytic CK- and PCK-discourse in physical education and PETE. First, CK is almost exclusively interpreted as knowledge in and about movement (Arnold 1979). In the review, this is made visible in the first, second and fourth assumption. If knowledge through movement is excluded, content such as body ideals or interpretations of sports historical events will not be regarded as CK. This content, which in many countries is part of the curriculum for physical education as well as for PETE, could be learnt through movement activities and not only through reading or writing. However, most of the current behaviour analytic research of CK and PCK does not consider movement as means for learning (i.e. that through wrestling we might learn about content such as sport history or perhaps gender roles in sports), but primarily as an object for learning in itself (i.e. that by doing wrestling we can learn in and about wrestling), which in turn limits the conceptualisation of CK in physical education and PETE. Second, contemporary understandings of CK and PCK have been mainly from a behaviour analytic perspective (Ward and Ayvazo 2016). While the behaviour analytic literature on CK and PCK, reviewed in the four assumptions above, draws attention to many aspects of teaching knowledge, it misses others. In the following sections, we want to draw attention to aspects of teaching that are important but that cannot be predicted or measured. Such aspects of teaching involve uncertainty
and demand a sensitivity to situation and context. In order to discuss these aspects of teaching, we draw on the concept of *phronesis*. This concept can, we believe, complement the behaviour analytic discussion of PCK in physical education and PETE and provide some sense of the subjective, ethical, and moral dimensions of teaching.

**Phronesis**

While the idea of phronesis originated with Aristotle, Joseph Dunne’s (1997, 2005) work has made the concept accessible for modern audiences (see Arnold 2001; Barker-Ruchti, Barker, and Annerstedt 2014; Cooke and Carr 2014; Jones 2017; Standal and Hemmestad 2011). Like others (Polanyi 1969; Ryle 2009), Dunne (1997) was dissatisfied with modern ways of conceptualising knowledge. Specifically, he was frustrated with what he saw as an over-reliance on behavioural logic in social arenas such as teaching and politics. In Dunne’s (1997) view, although behavioural logic has many merits, it fails to acknowledge the interpretive and subjective nature of knowledge and engagement. To highlight the value of a different way of knowing, Dunne refers to Aristotle’s writings on technical logic and practical logic. Aristotle aligned techné, or technical logic, with production, or poeisis.¹ Praxis is a different kind of activity that requires a different kind of knowledge. Still drawing on Aristotle, Dunne (1997) suggested that praxis refers to:

> Conduct in a public space with others in which a person, without ulterior purpose and with a view to no object detachable from himself, acts in such a way as to realize excellence that he has come to appreciate in his community as constitutive of a worthwhile way of life. (Dunne 1997, 10)

Dunne makes a compelling case for considering teaching as praxis rather than production. He suggests that teachers can rarely specify precisely the learning that will occur prior to the educational event. He notes that teachers are in many instances concerned with what is good rather than with what is right or true. He also questions the idea of certainty in teaching, suggesting that people can never be certain of the results of their actions.

Some knowledge required for praxis such as teaching is personal and experiential – this kind of knowledge is what Aristotle coined phronesis. This is a supple and less formulaic kind of knowledge than that needed for production. Rather than see knowledge as neutral and objective, this view of knowledge is based on the idea that people’s prejudices do not only distort but that they can be fruitful and are ultimately unavoidable in all understanding. Dunne (2005) draws on the work of Hans-Georg Gadamer, who proposed that ‘what’ people are trying to understand only becomes a ‘what’ within their prejudices.

Several related points can be made concerning phronesis. First, Dunne (1997) suggests that phronesis involves situational appreciation and critical judgement. He provides an example of how a person might develop phronetic knowledge in painting, suggesting that: ‘an artist in art school learns how to watch himself paint – the critical activity is part of the work itself’ (Dunne 1997, 74). In teaching, we might recognise a similar process: the critical activity is not teaching but understanding how one is teaching. In this sense, it is not the outcome (‘knowledgeable pupils’, for example) that defines the act of teaching, but the teacher’s understanding of how s/he is teaching.

Second, phronesis is realised in concrete applications; it is not generalisable knowledge that stands apart from application. Rather, it is about bringing together general principles while respecting the particularities of the case. Dunne (2005) suggests that a person’s phronetic adeptness lies,

> neither in a knowledge of the general as such nor in an entirely unprincipled dealing with particulars. Rather, it lies precisely in the mediation between general and particular, in the ability to bring both into illuminating connection with each other. This requires perceptiveness in her reading of particular situations as much as flexibility in her mode of ‘possessing’ and ‘applying’ the general knowledge. (Dunne 2005, 376)

In other words, phronesis cannot be learned from a textbook or classroom and then *transferred* to real situations. Phronesis is related to experience but being experienced can be thought of as not
having already done everything but as being ready and open for something new. In today’s terms, we might refer to phronesis as practical wisdom, nous, prudence, or a habit of attentiveness (Dunne 1997).

Finally, phronesis has an ethical dimension. Dunne contends that, ‘the truly experienced person is someone who has gained experience into his own existence … who knows that he is master neither of time nor the future … (an) experienced person knows that things are finite and limited’ (1997, 131). For Dunne (1997), the phronetic practitioner is one who recognises these things and who knows how to live well in one’s actions with one’s fellows.

Phronetic pedagogical content knowledge – implications for PETE

In this section, we use the theory building strategies outlined earlier (reflectiveness, metaphorical thinking and borrowing) to consider PCK in phronetic way. The elements of phronesis in focus – context, interpretation, diversity and uncertainty – are concepts which are all central to Dunne’s (1997) description of phronesis. In each case, we give concrete examples of how current understandings of PCK can be extended by reference to phronesis, and the implications this might have for PETE.

The place of context

The concept of phronesis and the behaviour analytic conception of PCK emphasise the meaning of context in different ways. Dunne (1997), like Jones (2017) and Standal and Hemmestad (2011), stresses that phronesis is concerned with the combination of knowledge of particular situations and general principles. Following the behaviour analytic discourse of CK and PCK, it seems to emphasise that knowledge of particular situations is separated from general principles (see assumption three). In this discourse, being competent to teach badminton does not mean that you are competent to teach basketball (Schempp et al. 1998; Ward and O’Sullivan 1998). A sticking point with the behaviour analytic approach to ‘context’ for physical education teachers is that it builds on the idea that developing PCK means becoming an expert in a wide range of established and traditional sports that each have their unique context. According to this logic, there will never be enough time or resources in PETE to develop sufficiently knowledgeable physical education teachers.

We believe in the importance of CK for developing PCK, but we agree with Macdonald, Kirk and Braiuka that ‘the strong classification of university knowledge’ (1999, 45) often prevents new and integrative considerations (Author 20xx). Instead of thinking of CK in physical education and PETE as built up by historically-constructed and already-established sports, we argue that the organisation of CK must build on the common qualities that cluster several physical activities together into movement cultures. This idea already exists in physical education and PETE content such as Teaching Games for Understanding (Bunker and Thorpe 1982), outdoor education (Backman 2008) and dance (Mattsson and Lundvall 2015). Other movement activities and sports such as gymnastics, track and field and swimming however, are strongly classified according to norms and standards of excellence when they are traditionally organised, taught and assessed within PETE (see Backman, Pearson, and Forrest [2019] for a further discussion). The context in, for example, gymnastics, including its rules, its equipment, the ways in which movements are normally performed, is often taken for granted and is well-known. The context in parkour in contrast, which could be seen as a combination of gymnastics and track and field and which involves several fundamental movement skills, is likely to be unknown for many students entering PETE with a sport habitus. From this follows that PCK in parkour is something that needs to be learnt by many pre-service teachers (and PETE educators). Parkour could be an example of a movement culture that is less imbued with norms of how to move and how to behave in comparison to traditional sports.

A physical education teacher with phronesis would acknowledge the meaning of context and specialist competence for developing PCK. To be a specialist in invasion games in a physical
education context however, does not mean that one must be a specialist in football, handball, basketball and so forth. Expertise and specialist competence lies in the teacher’s capacity to identify common and context-specific factors for the different activities, and to use this knowledge to create different teaching situations. Therefore, PCK for physical education teachers does not only assume CCK, SCK and the ability to assess appropriateness of tasks (see assumption one, two and three), but also knowledge of educational movement contexts and cultures (Shulman 1987).

Borrowing from Dunne (1997), teaching competence in physical education is from a phronetic perspective based on both general and specific principles and is enacted in concrete applications. We believe that one central challenge for PETE, a context in which CK is often strongly classified (Macdonald, Kirk, and Braiuka 1999), lies in identifying new integrative approaches to movement cultures, and the elements that hold these movement cultures together. Another challenge lies with critically selecting which movement cultures to focus on (Author 20xx).

**The place of interpretation and diversity**

Jones (2017) suggests that teachers need to be able to act on intuition and in contextual situations according to ethical and moral judgements. A teacher with phronesis, he suggests, is able to choose the right action at the right time for the right reason. As Dunne (1997) argues, the teacher’s ability to interpret individuals and situations is vital in order to make good choices in teaching. A phronetic teacher is one who can effectively ‘read’ his/her students’ understandings and emotional stances as they appear in various physical education contexts, and act on them ‘in the heat of the moment’. This means being sensitive to, and showing care for, individual differences regardless of whether it is about gender, social class, ethnicity, disability, bodies or mental health (Jones 2017). Shulman (1987) also emphasises knowledge of learners and their characteristics as a vital form of teacher knowledge. We suggest that this form of knowledge can start to be developed during PETE and not only during practice as a physical education teacher. Some students might express anxiety and fear towards certain physical activities or towards the teachers’ way of presenting physical activities when other students do not. An important task for the teacher then is understanding who is experiencing what in the classroom at any given time.

In the analysis of the assumptions presented in this paper, we tried to keep a reflective distance to the behaviour analytic discourse of CK and PCK in PETE (Thomas 2007). From our perspective, physical education teachers’ interpretations of their students seem to play a marginal role in the behaviour analytic research about PCK. As displayed in assumption two and three, the ‘delivery of teaching that works’ and the avoidance of inappropriate tasks are described as something that can be decided in advance, not as something that are discovered and acted upon during teaching (Ayyazo and Ward 2011; Iserbyt, Ward, and Li 2017). As we understand it, the behaviour analytic approach pays little heed to the adjustments teachers must make in response to students’ actions in situ. Although the interpretive dimension of teacher knowledge is difficult to acquire or teach in any conventional sense (Jones 2017), we want to propose that PETE educators should acknowledge pre-service teachers’ capacities to reflect and act based on *their interpretation of teaching and of the diverse needs of their students*. Alderman (1997) suggests that one way of learning phronesis is to observe how phronetic people act in authentic situations and then try to imitate them. The interpretive dimension of teaching could also be developed through observations of students’ actions and reactions, and facial expressions, perhaps with the help of films of lessons during PETE.

**The place of uncertainty**

Dunne’s (1997, 2005) assertion of the uncertainty of praxis has relevance for physical education teachers, especially with regard to assessment and accountability. As discussed in all four
assumptions, the behaviour analytic discourse on CK and PCK suggests that it is possible to predict whether different demonstrations of movement and teaching tasks will result in correct/appropriate or incorrect/inappropriate behaviour (Ayvazo and Ward 2011; Iserbyt, Ward, and Li 2017). Borrowing ideas from Dunne (1997, 2005) we would ask: correct or appropriate in relation to what? The tendency to measure PCK in PETE appears to be related to a wider discursive trend whereby society expects ‘black-and-white’ answers from scholars, and accountability and performativity are guiding principles of contemporary educational systems (Ball et al. 2012).

The notion of uncertainty urges us to consider what ‘right solutions’ are in relation to teaching. It may not even be necessary to look for the right way and indeed, there may be multiple right ways of knowing. Physical education teachers might employ all the strategies they had planned and things still take place in unexpected ways. A behaviour analytic perspective does not leave open this possibility. The notion of uncertainty in relation to movement in physical education and PETE has been acknowledged in research questioning standards of excellence (Backman, Nyberg, and Larsson 2020; Barker et al. 2018; Larsson and Quennerstedt 2012; Nyberg and Larsson 2017). We believe that PETE would benefit from introducing questions as those previously mentioned, not only concerning movement but also when it comes to content such as body image, experiences in nature, interpretation of sports historical events.

**Conclusions**

We have aimed to contribute complementary ideas that could extend conceptions of PCK in physical education and PETE. Behaviour analytic approaches to PCK have, in our view, been narrowly interpreted as: teachers’ representations of CK; the instructional tasks that are used to teach CK; and the adaptations of those tasks to student needs. In this paper, we have proposed that PCK should involve more. Using strategies of theory building (Shoemaker, Tankard, and Lasorsa 2004; Thomas 2007; Whetten 1989) and drawing on the concept phronesis (Dunne 2005; Cooke and Carr 2014; Jones 2017; Standal and Hemmestad 2011), we have claimed that PCK could also involve actions such as identifying contextual characteristics for ‘new’ and integrative movement cultures in physical education; interpreting students’ actions and reactions; identifying and acting on diversity during physical education teaching; developing a sensitivity for what is morally ‘right’ to do in a certain situation; and accepting and managing the uncertainty of not knowing in advance what a ‘correct’ action is. These knowledgeable actions are not easy to teach (or assess), however, this does not mean that they are not a part of PCK for physical education teachers. We have provided some suggestions for how these aspects of PCK could be introduced in PETE practices but this warrants more attention.

**Note**

1. Poeisis is an activity that results in a durable outcome or product, where the outcome can be stated before the maker begins the activity. For poeisis, knowledge should be technical, neutral and located beyond both the content or the knower.

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