Moving online in physical education teacher education

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ABSTRACT

In this paper, we consider the challenges for Physical Education Teacher Education (PETE) that were presented during the COVID-19 pandemic in regard to preservice teachers’ knowledge in and about movement and their developing movement capability. Historically, learning about movement as well as learning in movement has always been central for physical education and PETE. The question this paper addresses is how the teaching and learning of movement capability are experienced by PETE educators and preservice teachers when taught online. We specifically ask what are the gains and losses when movement knowledge is taught online in PETE compared to when taught in face-to-face teaching? Movement knowledge in this study is firstly inspired by Arnold’s (1991. The preeminence of skill as an educational value in the movement curriculum. Quest, 43(1), 66–77) conceptualisation of knowing in and about movement. Our conception of the meaning of knowing in movement is also informed by the concept of movement capability as outlined by recent research. We argue that movement capability offers some additional unique perspectives to our research question. Educators and preservice teachers at two PETE institutions in Sweden were interviewed in order to investigate their experiences of teaching and participating respectively in movement courses as full online education due to restrictions imposed by the COVID-19 pandemic. The informants were asked questions about their experiences of having participated in movement courses face-to-face as well as online. The combination of Arnold’s framework (knowledge in and about movement) with movement capability in this study increases the understanding of the meaning of movement knowledge for future physical education teachers. The results show that possibilities to develop movement capability at the one hand seem to be reduced with regard to opportunities to interact face-to-face with other people whilst at the other hand, possibilities to develop movement capability seem to be increased when learners can practise specific ways of moving without an audience.

Introduction

In this paper, we consider the challenges for Physical Education Teacher Education (PETE) that were presented during the COVID-19 pandemic in spring 2020 in regard to preservice teachers’
knowledge in and about movement (Arnold, 1988) and their developing movement capability (Nyberg & Carlgren, 2015).

In the school subject of physical education as well as in PETE, movement is a key content. Historically, learning about movement as well as learning in movement has always been central for physical education (Arnold, 1988; Brown, 2013a; Tinning, 2010) Internationally, as PETE has become more academic and focused on theory, we have seen the tendency for movement courses in PETE to become increasingly marginalised (Kirk, 2010; Tinning, 2022).

The ability to move is regarded by Swedish PETE educators as an important part of the professional knowledge base for physical education teachers (Backman & Larsson, 2016). However, Backman and Pearson (2016) have revealed that the valuation and assessment of movement skills is still a complex issue in Swedish PETE. Part of this complexity is related to whether the ability to perform movements or to teach movement should be prioritised in PETE (Backman & Barker, 2020). Commenting on the PETE programmes in different European countries before the COVID-19 pandemic, O’Brien et al. (2020) claimed that ‘it is clear that a number of the externally mandated practical components of PETE face significant challenges’ (p. 506). The COVID-19 pandemic added a significant new challenge to these practical components.

In PETE, movement for instrumental and educational purposes has been traditionally taught in classes with face-to-face teaching. After the COVID-19 pandemic breakout in March 2020, many educational institutions had to close and switch to full-time online teaching. Not-with-standing some important recent work on the consequences of the COVID-19 pandemic for teaching in PETE (Luguetti et al., 2021; McCullick, 2021; O’Brien et al., 2020; Varea & Gonzalez-Calvo, 2021), and for teaching in school physical education (Vilchez et al., 2021; Yu & Jee, 2020), there is still relatively little knowledge about the effect of online teaching in PETE (Hyndman, 2017; Lander et al., 2022).

Moreover, there is still a lack of more in-depth knowledge about what education in and about movement becomes, and how it is experienced, when PETE movement courses are transformed to full online education. From the limited research conducted, it is clear that there are substantial challenges regarding online PETE. What is unknown, however, is what these challenges are. Therefore, the aim of this research is to investigate the experiences of PETE educators and preservice teachers in regard to movement content knowledge in PETE when faced with a transition from traditional classes to full online teaching and learning. Our research question is: What are the gains and losses when movement knowledge is taught online in PETE compared to when taught in face-to-face teaching?

Expanding knowledge about this issue is particularly important for PETE since movement, struggling against stronger classified subjects such as sports history, physiology and anatomy (Chang-Hyun, 2013; Kim et al., 2015; Kirk, 2010), has become a more marginalised element of physical education teachers’ professional knowledge base.

**Education in and about movement in Swedish PETE**

There are eight universities in Sweden (where the present study was conducted) offering PETE. The courses in subject matter knowledge can vary from one and a half to two years (two years at the investigated universities). The number of required movement knowledge courses (e.g. practical) in a programme is not regulated at a national level and therefore varies between the PETE universities in Sweden (Backman & Larsson, 2016).

It should be emphasised that education in and about movement in PETE reflects how steering documents organise content in school physical education, namely in terms of broader knowledge areas (e.g. outdoor education, dance, health) rather than by traditional sports (Backman et al., 2020; SNAE, 2011).

It is difficult to generalise around the position of movement courses in Swedish PETE and the epistemological orientation underlying these courses (Backman & Pearson, 2016). Nevertheless, studies point to some distinguishing features. For example, Maivorsdotter et al. (2014) reported that
performance of movements in sport activities seems, in the eyes of the students, to be prioritised before learning how to teach. Indeed, preferences for sport performance in school physical education arise where logics of performance, and doing rather than learning, prevail (Lundin & Schenker, 2022; Redelius et al., 2009).

In addition to this, it is suggested that learning outcomes in Swedish PETE address movement as techniques, isolated from their context (Backman & Larsson, 2016). While most Swedish researchers of physical education and PETE can be claimed to belong to a socially critical epistemology, this orientation do not seem to underpin movement courses in Swedish PETE in general (Backman et al., 2021). Interestingly, although Swedish PETE educators claim movement competence to be important, they cannot clearly state what should be learned by their students with regards to movement (Backman & Pearson, 2016).

Recent studies (Nyberg, 2015; Nyberg, Barker, et al., 2020; Nyberg & Carlgren, 2015) investigating what movement knowledge can mean if it is not a matter of performing predetermined movements and sport techniques, present a perspective of movement knowledge in terms of **movement capability**.

**Movement capability**

Movement capability involves specific ways of knowing movements such as for example: discerning one’s own and others’ ways of moving; discerning ways of using space; navigating one’s embodied awareness, regulating one’s speed and solving acute movement problems (Nyberg, 2015; Nyberg, Backman, et al., 2020; Nyberg, Barker, et al., 2020; Nyberg & Carlgren, 2015; Nyberg & Larsson, 2014). This kind of knowing acknowledges the perspective of the mover and is neither merely practical nor theoretical, but an indivisible combination of both. Developing movement capability is in this sense an explorative journey into a movement culture where the learner gradually comes to discern and experience details, nuances and their relationships.

Our conceptualisation of movement capability is inspired by Arnold’s (1991) conceptualisation of knowing in and about movement. In particular, it has similarities to Arnold’s in-dimension (Nyberg & Carlgren, 2015), yet it offers some additional unique perspectives. The idea of movement capability reflects a holistic perspective, taking into account the perspective of the mover and the environment, and raises the question of what it can mean to know, or master different ways of moving (Backman et al., 2020; Nyberg, 2015). This perspective challenges narrow and reductionist views on what counts as ability (Croston & Hills, 2017; Larsson & Nyberg, 2017; Larsson & Quennerstedt, 2012; Tinning, 2010) as well as a conception of physical skills as separated from mental skills (Nyberg, Backman, et al., 2020).

This view on movement capability is beginning to spread in Swedish PETE (Nyberg, Backman, et al., 2020) and has recently gained attention in research with the aim of challenging conceptions of ability in physical education and in PETE (Backman et al., 2020; Nyberg, Barker, et al., 2020).

Importantly, movement capability should not be equated with, or reduced to physical literacy. Physical literacy certainly has widespread international popularity (see for example Whitehead, 2019, pp. 74–95) and is clearly influencing physical education and PETE in Sweden (see Lundvall & Tidén, 2013) but, in essence, it has an instrumental telos and focuses on developing a ‘set of capabilities and dispositions that enable active participation in movement cultures across an individual’s lifespan’ (Ovens & Enright, 2021, p. 96). Movement capability on the other hand builds from a different epistemology and has no such instrumental objective. Rather, movement capability focuses on knowledge in movement, and provides the possibility to explore the multifaceted understanding of the meaning of movement knowledge.

**Digitalisation, COVID-19 pandemic and PETE courses**

In PETE as well as in school physical education, the use of digital technology preceded the COVID-19 pandemic breakout by a considerable time period. Of course, digital technology is, and has been, used in traditional face-to-face teaching but is a prerequisite in online teaching. There is an intensive
ongoing discussion regarding the pros and cons of the use of digital technology in physical education and PETE (see for example: Butts et al., 2013; Casey et al., 2017; Gard & Pluim, 2017; Goad et al., 2019; Isgren Karlsson et al., 2022; Vilchez et al., 2021; Yu & Jee, 2020). While some scholars highlight negative experiences of using digital technology other scholars contribute with positive experiences as for example Hyndman (2017) who reports the benefits of using GoPro cameras for simulation pedagogy. Additionally, benefits could also be possibilities to ‘fill specific gaps in teacher education and knowledge, such as motor skill instruction and assessment’ (Lander et al., 2022). The discussion of digital technology in physical education and PETE was intensified due to the COVID-19 pandemic, particularly in those countries that used extreme lock-down measures (Lander et al., 2022; Varea & González-Calvo, 2021).

Physical education has been described as one of the subjects with the greatest challenges in the transition to full online education (McCullick, 2021). After the COVID-19 pandemic, scholars have emphasised that physical education teachers have to adjust to the ‘new normal’ with regards to time and space for teaching (Calderón & MacPhail, 2021; Yu & Jee, 2020). The sparse, but important research work related to PETE during the COVID-19 pandemic focuses critical pedagogy (Luguetti et al., 2021), absent bodies and touch as ‘risky business’ (Varea & González-Calvo, 2021) and comparative SWOT-analysis regarding the management in different countries (O’Brien et al., 2020). The experiential nature of physical education, and the ‘hands-on’- approach, makes full online education particularly problematic for teachers as well as for preservice teachers who are keen to undergo their school placement courses face-to-face (Varea & González-Calvo, 2021). In a study by Luguetti et al. (2021), PETE educators describe challenges in creating relations to preservice teachers in digital environments. O’Brien et al. (2020) have also discussed potential impacts on the well-being of PETE staff and preservice teachers as a result of the transition to full online education.

At the time of writing, there is a lack of studies focusing specifically on how the teaching and learning of movement knowledge has been transformed in the transition from traditional face-to-face education to full online education due to COVID-19, and how this transition and transformation have been experienced by PETE educators and preservice teachers. As Tinning (2022) points out, ‘on-line teaching has particular consequences for practical movement-based courses’ (p. 13). Further, Calderón and MacPhail (2021) emphasise the importance for the PETE community to ‘maintain the momentum gained from the consequences (and opportunities) of the COVID-19 pandemic to rethink the philosophies and pedagogical practices that are appropriate for PETE now and in the future’ (p. 8).

Research design

In this project, PETE educators and preservice teachers at two PETE institutions in Sweden were interviewed in order to investigate their experiences of having taught and participated respectively in movement courses as full online education due to the COVID-19 pandemic.

Participants and collection of data

In Sweden, there are eight PETE institutions. A criterion for the selection of two PETE institutions to this project was that the informants from the institutions had experience from movement courses that had maintained some sort of practical character even though they transformed to full online teaching. This criterion narrowed the possible sample of PETE institutions. The limited number of Swedish PETE institutions, as well as the fact that there are regular national meetings for PETE educators, made it possible for the first and second author to be well-informed of the national PETE context and the movement courses given at each institution. The particular Swedish PETE institution where the first and second author are employed was excluded from the sample. From the PETE institutions that fulfilled the first criterion, the two institutions that were selected were the ones where the authors had best established contacts. The strategy can be described as a combination between convenience sampling and strategy sampling (Patton, 2002).
The initial ambition was to include six PETE educators and six preservice teachers, equally divided on the two PETE institutions. From the two PETE institutions a total of 10 participants then contributed to the study. From one of the institutions (Uni 1) there were seven participants: three PETE educators (PE 1, 2 and 3) and four preservice teachers (PS 1, 2, 3 and 4) and from the other (Uni 2) there were three participants: two PETE educators (PE 1 and 2) and one preservice teacher (PS 1).

After having identified two PETE institutions, the PETE educators who were approached agreed to participate. The criteria for selection of PETE educators were based on: (1) experience from having taught a movement course in PETE during the COVID-19-transition from face-to-face teaching to online teaching, and (2) that the PETE educators represented a variety of movement practices (e.g. dance, ballgames, outdoor recreation, etc.). The PETE educators who agreed to participate informed preservice teachers in their movement courses about the study and invited them to contact the researchers if they were interested.

The interviews

The informants were asked questions about their experiences of having participated (as educators or preservice teachers) in movement courses online. Each informant participated in one semi-structured in-depth interview, conducted online. The first author conducted interviews at University 2 and the second author conducted interviews at University 1. The interviews ranged between 30 and 70 minutes. More specifically, the interviews dealt with the following overall questions (slightly adapted to whether the informant was a PETE educator or a preservice teacher):

- How did you experience the transition from traditional teaching to online teaching?
- Did you experience any differences regarding teaching/learning a movement course taught in a traditional manner compared to one taught online?
- What is the future for movement courses online in school physical education and in PETE?

The interview guide was constructed with inspiration from Arnold’s (1988, 1991) conceptualisation of knowledge in, about and through movement, as well as from the concept of movement capability (Nyberg, Barker, et al., 2020). These concepts offer a wide perspective of different forms of knowledge for preservice teachers in physical education. The recorded interviews were transcribed verbatim by an external part.

Analysis

The question that informed the analysis was what seems to be missing and gained in the teaching and learning regarding movement knowledge in the courses that the interviewees were asked to talk about.

In the first step of the analysis, we used what Miles et al. (2013) refer to as In Vivo Coding. All expressions regarded as in some way related to movement knowledge were marked and coded in terms of for example ‘interaction with others’, ‘room and feelings’, ‘transformation into knowing about’ and ‘non-verbal communication’. Movement knowledge was in this case informed by the notion of movement capability and knowledge in movement, as elaborated on earlier. In the second step of the analysis, the first author clustered the marked expressions into different categories representing different dimensions with regard to the meaning of movement capability and knowledge in movement. These categories as well as their headings were then discussed and revised twice in the whole research group via online meetings.

Results

Below, we first present identified aspects of what we interpret ‘as missing’ regarding preservice teachers’ possibilities to develop movement capability. This is not to say that these aspects are
completely missing, rather more or less restricted. Thereafter, we describe what we interpret as gained concerning possibilities to develop movement knowledge.

**What seems to be missing?**

**An authentic introduction to movement cultures**

Being introduced to a movement culture that preservice teachers are not yet familiar with is apparently crucial for enhancing development of movement knowledge. When preservice teachers meet a new movement culture in PETE (in this case dancing), it seems to be a challenge for PETE educators to create a practice online that is similar to an authentic movement culture. Although it is not easy to create such a practice in face-to-face teaching either, this challenge seems to be even more accentuated when the context is a lonely preservice teacher and his/her PC. One preservice teacher highlighted this in saying:

> Then I think it’s harder when it’s so connected to music and that there’s a connection with the room where you are dancing. It becomes really challenging when you are alone at home. So, if you don’t have that feeling from before, then I think it could be difficult to discover it on your own. (PST 1 Uni 1)

This preservice teacher talked about ‘the room’ and ‘feelings’ that the context can create. If a preservice teacher has been introduced into a movement culture of dancing previously, this experience may enhance learning in dance also online.

> So you don’t really know if you learnt something properly online. Or you get an idea about what dance is supposed to be, and you are supposed to manage somehow. (PST 1 Uni 2)

The above quote also attests to the difficulties in learning new ways of moving when one may not have got a sense of what it ‘is supposed to be’. It seems to be important to get an idea of what it is about and this requires experiencing a new movement culture in the company of other preservice teachers, the PETE educator as well as an authentic context.

**Learning different sports**

Practical movement knowledge seems to be, in some cases, transformed to theoretical movement knowledge when the teaching and learning is conducted online.

> Then we had a lecture on Zoom about cross-country skiing equivalent to alpine skiing, where we watched films and looked at different changes in speed in cross-country and the different ways to ski, from plough to parallel in alpine skiing and so on. (PETE 3 Uni 1)

The above quote reflects a complete transformation from preservice teachers’ possibilities to practice and develop their capability to ski. In some cases, the preservice teachers got tasks that could be seen as practicing decontextualised sport skills. The PETE educator below regarded this as ‘ridiculous’ and what seems to be missing here is the relational aspect of the capability to participate in ball games.

> But it gets a little ridiculous, standing and bouncing a ball at home, on your own, because that is not ball games. You might handle the ball, but it’s not a ball game. Ball games is a relational phenomenon. […] This will be second-class teaching in terms of subject knowledge and those aspects. They don’t get any chance to try things in the right way. (PETE 2 Uni 1)

There are also expressions indicating that due to the teacher’s experience of insufficient teaching, they cannot expect that the preservice teachers should know as much as the PETE educator hoped for: ‘So they sent me films. I have to say that I have to be much more lenient in my assessment this way because they haven’t received very much – I mean, it’s hard for them to pull it together’. (PETE 2 Uni 2)

As we can see, practical movement knowledge is sometimes completely transformed into theoretical movement knowledge, and sometimes transformed into solely practicing decontextualised
sport techniques. Thereby the relational aspect of practical movement knowledge disappears when taught online.

The possibility to read each other
Aspects such as interacting with other people in time and space seemed to be missing according to preservice teachers as well as PETE educators. This was expressed as a kind of non-verbal knowledge involving all senses, for example, judgements about how to act and move in relation to other people when dancing:

It’s the interaction with others … that we feel. That’s a great aspect of cultural dance, I think. To look at somebody: now you and I are going to dance, and I look at you and I move closer to you. I take your hands and we are in contact with each other, and I’m met either by willingness or the opposite. You can feel this somehow. And my thinking is that all of these impressions are important. (PETE 2 Uni 2)

The importance of meeting and engaging with other people when developing practical movement knowledge was also acknowledged by the preservice teachers:

Because you don’t see anything on Zoom. You see yourself or the small boxes with the images of your friends. If it’s live, then you see them for real and can actually, yes, engage in a completely different way than what you can do through the screen. (PST 1 Uni 1)

PETE educators and preservice teachers expressed, in different ways, that something is missing when teaching and learning are conducted online. It is the interaction (or transaction) between preservice teachers, as well as between PETE educators and preservice teachers. The PETE educator’s opportunity to get a sense of what preservice teachers know was conceived as more trustworthy when they meet face-to-face. It seemed to be a matter of opportunities to problematise issues during lessons and to read each other, as one PETE educator said:

I would choose to meet them live every time, simply from the perspective of learning. On Zoom, there isn’t any kind of dynamic in a discussion. And it makes me think about problematisation – you need to be able to read each other in some way. (PETE 3 Uni 1)

To read each other in this context could mean to be aware of responses and reactions expressed in other ways than merely words. This opportunity to read each other seemed to enhance teaching through feedback, because ‘you can get a sense of a student’s ability when you meet them’ (PETE 3 Uni 1). Possibilities to read each other in this way was conceived as missing to a certain extent when meeting each other online. Meeting each other face-to-face was expressed as a ‘completely different matter’ (PST 1 Uni 1). Lack of possibilities for non-verbal communication obviously affects preservice teachers’ sense of learning in a restricted way:

But on campus, it was a whole lot easier because it’s about interaction within a space, interaction with people in that space, and listening to the teacher who is telling you what they know. (PST 1 Uni 2)

Interaction, and the possibilities to read each other seems to be an appreciated aspect of both teaching and learning. In sum, what seems to be missing with regard to movement knowledge concerns areas which we choose to call An authentic introduction to movement cultures; Learning different sports; and The possibility to read each other. We regard all these areas as dimensions of practical movement knowledge.

What seems to be gained?

Theoretical movement knowledge
Both educators and preservice teacher described that some forms of teaching, such as for example lectures, could be well suited for online teaching. Below, one of the PETE educators described online lectures about different forms of skiing.
We have had a lecture, or something like a lecture, on Zoom, that was about cross-country skiing. It was about how to ski. We watched films about this and focused on the content knowledge in skiing, different ways to ski. And we did the same in downhill skiing. (PST 1 Uni 1)

It is not mentioned in the quote above if the online lectures were a consequence of the Covid pandemic, or if the PETE educators had chosen this form of teaching, regardless of Covid-restrictions, because they thought it was the most effective form of teaching. However, from the preservice teacher’s quote below, it is clear that he thinks that all content does not need to be practiced, but that some can be learnt theoretically.

I thought the theoretical part with content knowledge about ice worked very well. It’s theory, learning about ice. It is much to read and to understand and you can do that purely theoretically. (PST 2 Uni 1)

The same preservice teacher that was positive to learning about ice through online teaching in the above quote, expressed some scepticism to the choice of films in their teaching about skiing. From his point of view, some films were too prescriptive and normative in their way of presenting how to ski.

When we have received films to watch, it has been films with skiers from the national team. Of course, it’s good for us to see how it ought to be done, but will anyone of us or our students ski as the skiers in the national team? (PST 2 Uni 1)

As it seems from PETE educators’ as well as preservice teachers’ point of view, some content can be well suited to be presented through online teaching. However, it seems important that the preservice teachers can recognise themselves when video recordings are used. Obviously, it is a challenge for educators to find examples of practice of sport and movement cultures that are not performed according to golden standards and ‘correct’ techniques.

**More time for discussion, reflection and communication**

One dimension that was clearly expressed by some PETE educators and some preservice teachers as a benefit of online teaching was the saving of time through effective communication. In the quotes below, the preservice teacher seemed to think that studying from home is both convenient and beneficial for concentration whereas the PETE educator emphasised the relief of not having to deal with all the material and logistics involved in face-to-face teaching.

Many of us [preservice teachers] have liked to have lectures and the theoretical stuff online. It’s comfortable to be able to sit home and concentrate. (PST 3 Uni 1)

I’ve had more time working with content knowledge than before. And it has been extremely satisfying. (...) I mean, in real life, when you stand there and they [the preservice teachers] are physically active, you can take a break and show films and give information through screens. But all this takes so much more time! You have to move, you have to manage all the equipment … (PETE 1 Uni 2)

Some PETE educators and preservice teachers mentioned that the handling of material and logistics was transferred from the PETE educator to the preservice teachers in those courses where preservice teachers were encouraged to practice sport in their homes. The PETE educator in the quote above also explained how he got more time to discuss tactics in ballgames when teaching online.

**Less exposure and a feeling of safety**

Several PETE educators and preservice teachers talked about the positive aspects for preservice teachers of being able to practice without having to expose themselves to others.

The ones that don’t like dancing in a big group can actually get the chance to develop themselves [in online teaching]. I mean, just by themselves and not in a big group. For them, this is a good alternative. (PST 3 Uni 1)

One preservice teacher also reflected over the potential involved in transferring the ‘no-camera-effect’ to real life and the beneficial aspect of exploring one’s own bodily movement without the observation of others.
Well, it would have been great to do these ‘camera-off’-exercises in real life as well. To sort off … turn the lights off and explore things on your own. (PST 3 Uni 1)

Obviously, the aspect of exposure involved in online teaching with camera function is complex. It can be beneficial, but it can also involve risks. In sum, what seems to be gained when movement courses are taught online we have chosen to call Theoretical movement knowledge, More time for discussion, reflection and communication, and Less exposure and feeling of safety. In the following sections, we will add the perspectives of knowledge in and about movement (Arnold, 1991) and movement capability (Nyberg & Carlsgren, 2015) to explore what expressions of teaching and learning movement knowledge online say about what seems to be regarded as important knowledge in movement education in PETE.

Discussion

Lost in the online transition – aspects of knowledge in movement

According to our analysis, what seems to be experienced as missing regarding movement knowledge is an authentic introduction to movement cultures; learning different sports and the possibility to read each other. A common reason for these experiences is apparently the lack of possibilities to meet each other in real life. However, there are dimensions of movement knowledge that some interviewees experienced as a gain. We have described one of these dimensions as a possibility to practice movement with less exposure and a feeling of safety, and the other dimension as theoretical knowledge about movement and more time for discussion, reflection and communication.

All categories under the heading what is missing are, as we see it, dimensions of knowledge ‘in’ movement although Arnold (1988) does not express these dimensions, explicitly as is done in this study. The first dimension: an authentic introduction to movement cultures involves aspects such as getting a picture of what a new movement culture ‘is about’ and it also involves getting a feeling provided by a context which could be the room, other people and/or the teacher. When there is no opportunity to experience an authentic context (i.e. learning knowledge ‘in’ movement) this will restrict learning new movement cultures (Arnold, 1991).

The second dimension; learning different sports, is in a way similar to the first. However, here it is narrowed down to learning specific sports-related movements in for example skiing and learning decontextualised sport techniques in ballgames. Participating in ballgames certainly requires being able to apply techniques in contexts that are not isolated, uniform and predictable, but instead they are complex, unforeseen and differentiated (Backman et al., 2021). The value of learning movement cultures in their authentic context is also emphasised by Brown (2013b) who suggest ‘movement contexts that posit a more intrinsic and subjective value of physical activity enhances the educational prospects and pedagogical potential of the field, as it acknowledges that different ways of knowing exist in physical education and movement’ (p. 34).

Although the dimension to read each other draws from dance as an example in our study, participation in ballgames is also enhanced by an opportunity to practice and learn to interact and read other peoples’ actions (Teng, 2013) which is sometimes described somewhat similarly in relation to dance. To read each other can also mean to interpret what other people seem to know which is expressed by one of the PETE educators as beneficial in the feedback process. We regard this third dimension as in line with Arnold’s description of communicating through the medium of the body (Arnold, 1991, p. 75).

One dimension of learning in movement that was, in relation to dance, expressed to be gained through the transition to online teaching was the possibility to practice with less exposure and a feeling of safety. This feeling of relief connected to turning the camera off might be a reflection of the fact that the preservice teachers experience dance (as was the example in this case) as a performance-culture (Gard, 2006). It might be that this culture is particularly brought to the fore when preservice teachers are expected to follow the leader (which can be the case in face-to-face teaching
as well as in online teaching). When preservice teachers are to demonstrate a dance to each other, camera off is not an option. Altogether, the result shows that it seems to be challenging to teach and learn knowledge in movement without possibilities to meet, interact and communicate verbally as well as non-verbally.

**The gains of knowledge about movement – transformations from what to how**

What seems to be gained in the transition to online learning concerns foremost theoretical knowledge about movement and more time for discussion, reflection and communication. According to Arnold (1991) theoretical knowledge about movement is necessary to develop a theoretical structure of the subject as a field of study.

A question that arises is what is this theoretical knowledge about movement? In the example with the online skiing course, the knowledge expressed is primarily about how to ski rather than what content knowledge in skiing could be. It is also expressed that this knowledge about how to ski (skiing techniques, mediated through films), has elite skiers as role models. This raises questions about in what way online teaching can stimulate different ways of moving in sport and movement cultures. Teaching about movement should not only be about re-producing standards of excellence. In the case of online teaching, one area of development would be to provide preservice teachers with online visual examples of what skiing can be about (traditions, norms, cultures, variations) and of how to move in varying ways (Larsson & Nyberg, 2017; Nyberg et al., 2020).

Another dimension of knowledge about movement that was expressed to be gained in the transition to online teaching was knowledge about ballgames although this was reduced to tactics about the game. Tactics were, in this online learning context, meant to be ‘discovered’ foremost by the preservice teachers themselves. Without support and guidance from an educator it is not likely that the knowledge the preservice teachers might gain will inform and guide their practice (Arnold, 1991; Lander et al., 2022).

**Movement capability: adding to the understanding of the in-dimension of movement**

One of the categories expressed as missing in the transition to online teaching was the possibility to read each other when interacting in real life. According to the interviewees, it seems difficult to verbalise what the capability to read another person actually means. Some express it as an embodied sense, somewhat similar to tacit knowledge (Polanyi, 1962). Here we think that the concept of movement capability (Nyberg & Carlgren, 2015) can offer a conceptual framework for understanding what it means to read another person’s movements that goes beyond the in-dimension of Arnold (1991). A capability to read each other could, for example, mean discerning and experiencing one’s own and other ways of moving also in terms of non-verbalised communication. It could also mean a capability of using space in relation to other people.

If preservice teachers will get opportunities to practice and develop different ways of knowing such as for example discerning one’s own and others’ ways of moving and discerning ways of using space, the learning environment needs to involve other learners and tasks that requires awareness of one’s own and other peoples’ differing ways of moving as well as possibilities to reflect on, and discuss identified differences with the others (Nyberg, Backman, et al., 2020; Nyberg, Barker, et al., 2020; Nyberg & Carlgren, 2015). A learning environment like this seems to be very difficult to provide through online teaching.

The possibility to get an authentic introduction to movement cultures was, as described in the results section, expressed as missing. An authentic introduction to movement cultures could be regarded as a start to getting familiarised with a movement culture in terms of a landscape. However, the process of coming to know involves exploration and participation in what Ryle (1949/2009) describes as ‘intelligent practice’. Such a learning environment must inevitably require time, reflection, awareness of one’s own and other peoples’ actions (opportunities to ‘read
each other’) that Smith (2011) asserts as necessary when learning movements. Such a learning environment also requires guidance from a knowledgeable teacher who can encourage the explorative process (see Nyberg et al., 2021 for a more thorough description).

If movement capability is understood as we have described it, the possibilities to develop ways of knowing seems to be reduced when the context is transformed from a context that provides opportunities to act and move in relation to other people, and thereby also a possibility to read each other, to a context where the learner foremost is alone with a computer.

However, we should acknowledge arising techniques regarding digital tools that may provide pedagogies supporting students’ development of movement capability. For example, the simulating pedagogy suggested by Hyndman (2017) provides promising opportunities for students to participate and engage in more authentic learning environments.

Conclusions

After the COVID-19 pandemic many universities around the world use online teaching tools to a greater extent than they did before the Covid breakout, and this goes for PETE departments as well. When considering to what extent and in what courses to use online teaching, some important aspects of the benefits and limitations need attention (Calderón & MacPhail, 2021; Lander et al., 2022). For example, Tinning (2022) suggest that we need to be careful that the parallel processes of academisation and digitalisation does not result in an erasure of movement from PETE.

This study adds to the knowledge about the gains and losses with transforming movement courses to full online teaching and it also says something about what PETE educators and preservice teachers prefer regarding how to arrange learning processes of movement knowledge. In that way, it adds to existing work on digitalisation in PETE (Barker et al., 2016; Hyndman, 2017; Lander et al., 2022) and on the particular consequences of the COVID-19 pandemic for teaching in PETE (Luguetti et al., 2021; McCullick, 2021; O’Brien et al., 2020; Varea & González-Calvo, 2021). The combination of Arnold’s (1991) framework (knowledge in and about movement) with movement capability (Nyberg & Carlgren, 2015) in this study increases the understanding of the meaning of movement knowledge for future physical education teachers. It also highlights the importance of further research on how different forms of knowledge are contextualised in the increased use of online teaching in PETE.

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