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Physical Education Teacher-Coaches' Epistemological Beliefs about the Source and Simplicity of Games Knowledge

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Author Biographies

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Abstract

Epistemological beliefs include personal views about the sources (i.e., mainly external resources such as experts versus multiple diverse sources) and simplicity (i.e., more factual and isolated or relatively ambiguous, complex, and transferable) about games knowledge help to inform teaching and coaching practices. The aim of this study was to better understand these epistemological beliefs of high school physical education teacher-coaches and whether they inform their instruction and/or school-based coaching methods. A qualitative grounded-theory method was used in the form of in-depth semi-structured interviews conducted with six secondary school physical education teacher-coaches from south-central Canada. Teacher-coaches believed that games knowledge in both physical education and extracurricular sports originate from a variety of internal and external sources, portray games knowledge as both simple and complex, associate physical education and extracurricular sports with different knowledge or learning processes, and differentiate their instructional strategies more in physical education compared to their coaching practices.

Keywords: Epistemology, source of knowledge, simplicity of knowledge, instruction, coaching

Résumé

Les croyances épistémologiques en éducation physique incluent des points de vue personnels sur les sources et la simplicité du savoir sur les jeux et orientent les pratiques d'enseignement et de coaching. Le but de cette étude est de mieux comprendre ces croyances épistémologiques d'enseignants-coach d'écoles secondaires et de voir comment ces croyances informent leur enseignement et leur coaching. Une approche qualitative de théorie enracinée a été utilisée sous forme d'entrevue semi-structurée en profondeur avec six enseignants-coach d'école secondaire . Ces participants croient que les connaissances des jeux tant en éducation physique que dans les sports scolaires ont comme origine diverses sources internes et externes, que ces connaissances sont à la fois simples et complexes. Pour eux, les connaissances et les processus d'apprentissage en éducation physique et dans les sports scolaires sont différents et ils différencient leurs stratégies d'enseignement plus en éducation physique que dans leur coaching.

Mots-clés : épistémologie; source de savoir; simplicité du savoir; enseignement; coaching.

Introduction

Epistemological Beliefs

The philosophical study of epistemology is concerned with understanding "how individuals come to know, the theories they hold about knowing, and the manner in which such epistemological premises influence the cognitive processes of thinking and reasoning" (Hofer & Pintrich, 1997, p. 88). Chinn et al. (2011) reports that, although researchers have used various terms and criteria to identify and assess the level of epistemological development, individuals tend to move from basic to more complicated views and ideas about knowledge, including how knowledge is created, constructed, developed, valued, and perceived. For example, those with a more dualistic perspective view knowledge as an absolute truth and tend to adopt a linear or convergent approach to learning wherein there is only a single correct answer and knowledge (for example, the answer to a question) is regarded as either right or wrong. In contrast, Hofer (2001) explains that those with a more multiplist view tend to view knowledge with more uncertainty (relatively), recognize and acknowledge different sources of knowledge and perspectives as equally valid, and evaluate and justify knowledge more contextually even in the wake of contradictory evidence. This evolving multiplist epistemological stage is often associated with constructivist views on teaching and learning (Green & Hood, 2013) and with age, life experiences, and higher levels of education (Bendixen & Feucht, 2010; Hofer & Pintrich, 1997).

Epistemological beliefs (EB) are one conceptualization of personal epistemology and are defined by Grecic and Collins (2013) as "one's beliefs about knowing and learning that reflect views on what knowledge is, how it is gained, and the limits and criteria for determining knowledge" (p. 152). In other words, EB are a set of convictions about knowledge and learning that are part of an individual's personal epistemology (Hofer & Pintrich, 1997; Hofer, 2001; Olafson & Schraw, 2010). Bendixen and Feucht (2010) explain EB as having five relatively independent dimensions that have been repeatedly assessed in teachers and widely acknowledged as providing a solid understanding of personal epistemology. The first three dimensions are the *stability* of knowledge; (i.e., stable or ever-changing), the *speed* of learning (slow or quick), and the *ability* to learn (i.e., fixed versus malleable). The *source* of knowledge posits that knowledge either originates from a single external-based source like an authority figure or it derives multiple diverse and credible sources including peers. The *simplicity* of knowledge dimension of EB ranges from naïve or underdeveloped beliefs about knowledge as relatively clear, uncomplicated, factual, isolated, and simple compared to more sophisticated views about the knowledge as more complex, inter-related, conceptually ambiguous, and less simple.

Teachers' Epistemological Beliefs

Considerable research attention has been given to the study of EB in education, most notably in teachers and pre-service teachers instructing 'traditional' subjects in 'traditional' classrooms (Bendixon & Feucht, 2010). More specifically, research has highlighted the important role that teachers' EB have on their instruction (Olafson & Schraw, 2010) and on the epistemic development of their students (Buehl & Fives, 2009; Hofer, 2001; Muis & Duffy, 2013). This EB-instruction-learning outcome process is described by Grecic and Colins (2013) as the "*epistemological chain*." There is evidence that if a teacher believes, for example, that the source of games knowledge is generally from external authorities is more likely to adopt rather teacher-centred instructional strategies such as modelling (Green & Hood, 2013). Buehl and Fives (2009) also identified common internal (e.g., self-reflection) and external (e.g., text materials) *sources* of

teaching knowledge in both prospective and practicing teachers, noting that EB about the sources of knowledge are generally associated with the degree to which the individual believes knowledge is internally constructed or externally communicated. Further, White (2000) found that most pre-service teachers held what was classified as underdeveloped EB concerning the *certainty* and *simplicity* of knowledge when presented with case studies of various teaching-related scenarios. These teacher candidates viewed classroom problems at a very basic level and relied heavily on past experiences to provide resolutions, rather than viewing the classroom as a complex environment of different learners wherein the perspectives of the students, their families, teachers, or school staff may be a valuable resource for solving issues.

Epistemological Beliefs in Teaching and Coaching Games

Compared to in classroom-based research, much less is known about the EB of PE teachers (Lodewyk, 2011), coaches (Grecic & Collins, 2013), and particularly PE teacher-coaches (Drewe, 2000). In a qualitative study with PE teachers, Quennerstedt (2013) showed how practical epistemological beliefs about the source of knowing ("knowing by doing correct movements, by trying, by imitating, by praising and cheering, by cooperating, by creating, by the changing of clothes, by acting in a certain locality and by resisting") were associated with constructivist instructional approaches in the form of teachers' "assessment of students' abilities, skills, and learning" and their experiential, learner-centred, and reflective practices (p. 329). There are only three known empirical studies investigating the EB of coaches. Two of these three known empirical studies of the EB of coaches applied qualitative methods (Christian et al., 2017; Grecic & Collins, 2012). These studies reported that expert adventure sport and golf coaches were determined to have discernable and complex EB that held practical implications in their instruction and underpinned their use of constructivist (i.e., experiential, learner-centred, and reflective) methods. In a recent quantitative study investigating the differences in EB between prospective PE teachers and coaches, Yildizer (2020) reported less availing EB (lower in learning depends on effort and higher in learning depends on ability and there is only one unchanging truth) in the coaching education students particularly in those with less coaching experience.

The paucity of studies on EB in PE teachers and in coaches may be due in part to the belief that knowledge acquired through experiential subjects such as PE and sports often tends to be undervalued and inadequately prioritized (Bleazby, 2015; Grecic & Collins, 2013). This is despite the noted evidence that students learning games in PE tend to learn basic knowledge (e.g., rules, techniques, equipment) along with more complex contextual knowledge (e.g., advanced tactical solutions, movement concepts, and combinations of motor skills) (Oslin & Mitchell, 2006). Edwards et al. (2016) noted that coaching has also traditionally been viewed as a simple and technical profession, where proficiency in motor skills is the primary performance objective for athletes; however, coaching is being "increasingly recognised as a social, non-linear process, replete with issues of contextual contestation and negotiation" (p. 201). It is also clear that teacher-coaches are in a unique position to influence students because of their increased social interactions with students both in and outside of the classroom setting (Camiré et al., 2017; Pierce et al., 2019).

Research Aim and Questions

This study utilized a grounded-theory methodology to better understand the EB in the source and simplicity of knowledge of high school PE teacher-coaches and how those beliefs inform their teaching and coaching instructional practices. This method was used because there

has been an overreliance on quantitative methods in researching EB in teachers' (e.g., Hofer, 2001), physical educators (Lodewyk, 2011), and coaches (Grecic & Collins, 2013; Edwards et al., 2016). The following three research questions were explored in this study: (a) What are the epistemological beliefs of PE teacher-coaches in terms of the sources and simplicity of games knowledge? (b) How are PE teacher-coaches' epistemological beliefs related to teaching and coaching games similar or different, and in what ways? and, (c) How do PE teacher-coaches' epistemological beliefs inform their teaching and coaching instructional practices?

Methods

Participants

The sample consisted of six secondary school PE teachers (three females and three males) from four schools in two school boards located in south-central Canada. At the time of the study, each participant was also coaching at least one interscholastic team sport at his or her school. Teacher-coaches that coach team-based sports were selected because of the similarities between teaching a PE class and coaching a team, rather than an individual-based school sport. The average age of the participants was 41 years and their experience ranged from 3 to 23 years of teaching and coaching (average = 16). Participants were representative of each secondary grade level (9-12) and the most common sports coached at some point in their careers were basketball (four of the six participants) and volleyball (three of the six participants).

Data Collection

Convenience sampling was utilized to initially recruit participants through personal contacts via their publicly accessible email addresses. Snowball sampling was then used to garner interest in the study and recruit further teacher-coaches. Finally, purposeful sampling enabled the selection of the final participants "from which the most could be learned" (Merriam, 2001, p. 61). The study was approved by a university research ethics board and each in the sample provided their informed consent prior to participating.

Interviews

A constructivist-grounded theory methodology (Charmaz, 2014) was used to make sense of participants' beliefs and develop a theory that was 'grounded' in the researcher's interpretation of their stories. The theory "emphasizes diverse local worlds, multiple realities, and the complexities of particular worlds, views and actions," (Creswell, 2013, p. 87) rather than a single 'truth' as voiced by the researcher as authority (Jones et al., 2014). According to Creswell (2013), interviewing is the most common method of data collection adopted by grounded theorists, including conducting interviews as a means of constant comparative analysis as the researcher attempts to hear and understand participants' voices, reflections, and experience. The interviews consisted of several open-ended questions read from an interview guide that were written by the first author in close consultation with three subject-area experts. The questions were designed to, first, collect demographic information and develop rapport with the participant as a means of building a relationship of trust and comfort in which the teacher-coach can share their knowledge and beliefs. A second set of questions were asked to prompt participants to reflect on their EB and the ways in which they teach and coach (Glesne, 2015). Both sets of questions are provided in Table 1. Each personal interview was conducted by the first author, lasted between 45-60 minutes, were recorded using an audio-recording device.

Table 1

Interview Questions

For demographic information and to develop rapport (i.e., trust and comfort) with the participant: (1) What grade(s) and courses do you teach? (2) What sport(s) do you coach? (3) Could you tell me a bit about your teaching and coaching background? (4) What do you feel is the purpose of physical education/games? (5) Are the objectives or aims of interscholastic sports the same or different? Why do you think that? (6) Do you believe that teaching and learning in physical education/games is easy or difficult? Why do you think that? (7) Do you believe that coaching is easy or difficult? Why do you think that?
To prompt participants to reflect on their epistemological beliefs and the ways in which they teach and coach: (1) What do you believe is the important knowledge that students take away from participating in games during physical education? (2) Is it the same or different from the knowledge gained by participating in interscholastic sports? Why do you think that? (3) Do you teach the same way you coach? Why or why not? (4) Can you describe a typical physical education/games lesson in your class? Can you describe a typical practice in the sport you coach? (5) Do you ever reflect on your students' learning as you consider yourself in the role of a teacher and a coach? If so, what do you think about? Why? (6) How has your teaching or coaching philosophy changed (if at all) or developed since you began teaching/coaching? (7) What are some factors that lead to these changes?

Data Analysis

The data analysis was completed by the first author and began with the verbatim transcription (typed) of the narrative from the audio-recording device immediately after each interview. Contextual elements of the dialogue (e.g., long pauses, vocal emotional responses, etc.) that were relevant to the data were also included. Each transcript was then read multiple times to generate an overall sense of the discourse and further familiarize myself with the data (Glesne, 2015). Each transcription was then re-read, and a thematic analysis (Charmaz, 2014; Creswell, 2013) was conducted by first searching for and writing down interpreted themes and patterns. This coding was later used to compare with the themes generated through initial, focused, and theoretical coding (Charmaz, 2014). Initial coding was completed by reading the transcripts and generating phrase or incident codes (Charmaz, 2014). These initial codes were in the form of action words and were written *in vivo,* or in the words of the participants (Glesne, 2015). Next, focused coding involved generating overarching themes or categories from similar initial codes established from each transcript, not on the basis of quantity, but rather founded on theoretical and explanatory power (Glesne, 2015; Jones et al., 2014). Compared to the initial coding, the focused codes generated were more conceptual in nature and were analysed against the current literature (Jones

et al., 2014). Definitions of meaning for each theme or category with relevant sub-themes and codes that inform and justify the developed themes were created. Each transcript was then re-read from the perspective of the themes (emerging from the researcher based on their analysis of the data) to test the developing concepts, examine the data through a different lens and add depth to the analysis (Sparkes & Smith, 2014). Finally, theoretical (or selective) coding involved linking the focused codes (themes) and sub-themes as a means of discovering theme interrelations (Charmaz, 2014) and theoretical conclusions that can be supported by the data and existing literature (Sparkes & Smith, 2014). The primary researcher did not assume a passive role in this meaning-making process, therefore, we acknowledge that the interview questions, researcher positionality, and even the subtleties of the language used or the interview environment that was created influenced the data collection and analysis (Glesne, 2015).

Results

The results of the study are structured by the three research questions – with the sub-headings representing the central themes within each (see Table 2).

Table 2

Summary of Findings

Teaching Beliefs	Coaching Beliefs
<u>Sources of Knowledge</u> • Movement and the body as valid sources of games knowledge • Students actively constructed knowledge internally • Teacher-coach as an authority or expert of games knowledge • Student peers as a source of knowledge through mentorship and leadership opportunities	
<u>Simplicity of Knowledge</u> • Games knowledge viewed as both simple and complex • Simple aspects: basic rules, skills, strategies, knowledge as health-related topics, 'quick' • Complex aspects: complex rules, skills, and strategies, knowledge as integrated, contextual and transferrable within and outside of a movement setting • An emphasis on participation and inclusion may obscure inferring beliefs about the simplicity of games knowledge	
<u>Domain-General and Domain-Specific Beliefs</u> • Knowledge extends across multiple learning domains (physical, cognitive, social) • Knowledge and learning processes reflect more skills & strategies	• Knowledge extends across multiple learning domains (physical, cognitive, social) • Knowledge and learning processes reflect more complex skills & strategies
<u>Games Instruction</u> • More differentiated instruction • Direct and indirect strategies (self-directed, inquiry-based, cooperative/peer learning) • Teacher as a 'facilitator' of learning	• Less differentiated instruction • Primarily direct approaches (drilling and repetition) • Teacher as an 'expert' of knowledge

Beliefs in the Sources and Simplicity of Games Knowledge

Knowledge as Learning in Action

Internally, teacher-coaches place emphasis on the role of movement experiences and the body as a valid source of knowing through participation in games. Examples included kinesthetic learning, feedback knowledge (knowledge of results or of performance), game play, sensory-motor experiences, decision-making, game scenarios as situated learning, and experiential learning. To illustrate, Scott described the importance of being a *"kinesthetic learner who is okay being put in that situation where they are learning from their physical mistakes*" and discussed how he promotes *"learning in action"* or *"learning while [students] are playing"* when he coaches.

Constructing Knowledge

The teacher-coaches believed that *how* students construct knowledge internally depends on their existing games knowledge. For example, when discussing how he might introduce a new game to his PE classes, Brendan indicated he uses the common teaching strategy of a diagnostic assessment or pre-test (Colquit et al., 2017), wherein he initially determines *"if the game can be played fairly successfully"* to establish an appropriate entry point for learning. Jeff added that students *"who have not had a good experience in PE often don't want to try or put the effort in"* inferring that motivation and attitude toward physical activity may also be influenced by previous experiences in games participation and can impact student learning. Each of the participants highlighted the importance of teachers providing learning experiences that can transform students' perceptions of games or physical activity.

Teacher-Coach as Knowledge-Expert

The sample suggested that knowledge in games also derives from external sources (like the teacher or coach and student peers) that are shared with students through various learning experiences. Previous studies confirm that the teachers and coaches are often regarded as the main source of games knowledge when it comes to student learning (Lodewyk, 2015). For example, when discussing skill development in games, teacher-coaches in this study referred to *"modelling"* (Jillian), *"showing"* (Scott) and *"demonstrating"* (Jeff) as a means of teaching movement skills to students. The teacher-coaches noted that many students they coached already had a foundation of game-specific knowledge and skills, so they believed their coaching function to be more use of *"little adjustments"* or *"correcting the little things"* (Jeff) to improve performance and game play. The teacher-coaches also preferred direct instruction when coaching as they viewed themselves as an authority of knowledge and relied on that to appropriately sequence and structure the content, learning tasks, and game play so students could apply and improve their knowledge and ability. Scott described this when coaching basketball as: "*We write it on the white board, we show it to them, we actually physically stand on the court, have guys do movement without defense first, then add in the defense second…and just kind of repetition over and over."*

Knowledge as Learning from Peers

Participants also acknowledged student peers as a recurring source of knowledge when teaching and coaching games. For teacher-coaches, this is achieved by providing various peer teaching, mentoring and leadership opportunities for students during both PE lessons and team practices. Brendan described appointing students as *"captains"* or *"assistant coaches"* in his

sport-focused PE class who are then responsible for *"taking direction of the class"* including *"initiating the warm-up"*, *"[running] drills with their teams"*, *"helping [other students] out with rules"* and *"organizing their own games."* The teacher-coaches implemented similar instructional strategies that promote learning from peers when they coached. For example, Karen indicated she would *"get senior students to take part"* in providing feedback and refining movement tasks as a means of mentoring younger students when practicing in field hockey.

Games Knowledge as Simple

Participants viewed certain components of games as simple including *"basic functional movements"* (Scott), *"basic rules"* (Jeff) and *"general strategies"* (Jeff). Jillian indicated that from the *"average"* high school student's viewpoint, learning in PE is *"something they are used to [and] are comfortable with"* and with the right *"positive energy, I think they find it easy to learn."* Jeff concurred noting that even in the case of unfamiliar games, students *"generally pick up things quite easily"* and *"pick up on it quickly"* but again noted that these beliefs are dependent on the individual student. Moreover, when Charlotte was questioned about her preferred instructional methods when both teaching and coaching the game of rugby at the high school level, she was quoted as trying to *"make it very simple"*, going as far as running *"basic drills…[including] stuff that they do with 6-year-olds."* There was very little discussion about challenging students and engaging into deeper learning experiences in games, particularly in the case of PE. Only Karen indicated that she implements a Teaching Games for Understanding instructional approach (Oslin & Mitchell, 2006) wherein she organizes lessons designed to progress *"from simple, to moderate, to complex [games] strategies by the end of the semester."*

Simplicity of Knowledge by Emphasizing Participation and Inclusion

Beliefs related to the simplicity of knowledge could be explained by the emphasis on student participation and views that all students should be provided the opportunity to participate in a variety of physical activities or games regardless of skill, ability, or other participation factors. When asked if there is an *over*-emphasis on participation that contributes to views of knowledge in games as simple and overall perceptions of PE as an 'easy' or 'non-academic' course, Jeff stated:

> *So, I do think that that plays into it* (PE) *being considered a bird course. I think that the participation is something that kind of hinders it a little bit, but at the same time, it's also that aspect and idea of we'd still like them to be physically active, and so you don't want to go too much in the other direction where they are so against sports and games and activities that they don't even bother signing up for the course. So, I understand there is a balance, but I do think it's tipped a bit too much in participation's favour at this point."*

Prioritizing participation and inclusion were also important for teacher-coaches in the context of their coaching roles. For example, both Charlotte and Karen indicated that they do not make 'cuts' for players trying out for sport teams as a means of promoting inclusion and providing physical activity opportunities for all students even in an extracurricular setting. Pertaining to her rugby team, Charlotte explained, *"I am very adamant about inclusion…my belief is, show up, get fit, and what's so awesome about rugby is that it doesn't matter your size or your shape or your ability, there's a position for you on the field."* This is in stark contrast to Scott's outlook that extracurricular sports should primarily *"focus on the aspect of winning and actually having a team that is built and essentially made for competition."*

Simplicity of Knowledge by Acknowledging Complex Aspects of Games

Participants discussed the importance of making connections *within* games, such as the ability to understand and perform *"transferrable skills that they can use across [different] games"* (Scott) and "*skills that they learn in PE, things like teamwork, communication and organization, are obviously applicable to other aspects of school"* (Charlotte). *These quotes and others provided evidence that the teacher-coaches did not believe that* games knowledge was mainly factual and simply memorized, and that games knowledge was disputable rather than being simply accepted from knowledge authorities such as a coach. Despite being advised that this study focused on games, many participants associated learning in PE with the comprehension of general health knowledge. When asked what the important knowledge that students take away from participating in PE classes, participants identified health topics such as *"nutrition"* (Charlotte), *"mental health"* (Jillian), *"making healthy choices"* (Karen), *"sexual health"* (Brendan) and *"drug [substance] use"* (Jeff). The teacher-coaches felt that participating in games through PE or extracurricular sports at the high school level encouraged students to participate in some form of physical activity as adults, regardless of whether they attained or demonstrated a deep level of understanding.

Comparing Teacher-coaches' EB in the Context of Teaching and Coaching Games

Developing the Whole Person

The teacher-coaches highlighted the important relationship between participating in games, physical literacy, and improved overall well-being and its positive outcomes beyond school. The following statement by Jeff reflects this: "W*e know that people who live healthy, active lives will benefit mentally, they'll benefit physically, emotionally, spiritually, all of those things. So that's why it's so important."* They asserted that development in both PE and extracurricular sports should occur across multiple learning domains (i.e., cognitive, social, physical, emotional, mental), although they emphasized the importance of the social domain (student-teacher, athlete/coach, and peer-to-peer) for games participation in both PE and extracurricular sport. Specific outcomes they associated with both PE and extracurricular sports included teamwork, camaraderie, team-bonding, team synergy, working as a team member, cooperation, and collaboration. They added several affective and cognitive outcomes related to sport more than PE such as "*emotional regulation"* (Charlotte), *"handling adversity"* (Scott), *"dealing with the highs and lows of being on a team"* (Charlotte), and *"learning how to win and lose properly"* (Jeff).

Learning Complex Movement Skills

The coaching role afforded participants the opportunity and optimal setting to explore more complex aspects of games with students such as knowledge related to advanced movement skills and more sophisticated offensive and defensive game tactics. Study participants also asserted that most students enrolled in PE at their school would not benefit from learning complex movement skills because their overall skill level was too low. For example, Jillian implied that she teaches *"a higher level of skills"* in extracurricular sports but *"would not be able to do those [same skills] in a regular PE class."* The level of complexity in skills that teacher-coaches chose to teach students or athletes on their teams may be associated with beliefs that PE should develop "*physical literacy"* (Charlotte), "*confidence in their body"* and the ability *"to move and feel comfortable"* in many diverse movement settings (Brendan) as a means of hopefully *"spiking a life-long interest"* (Scott) to enable them to *"find something they will continue to pursue after high-school"* (Jeff).

Learning Advanced Tactics and Strategies

Knowledge related to advanced tactics and strategies appeared to be more important to the teacher-coaches in their coaching compared to their teaching. To illustrate, they specifically highlighted the importance of having a knowledge base of sport-specific movement skills (that the athletes on their sports teams usually have) because it serves as a springboard for learning and performing more complex game tactics and strategies. For example, when discussing how she might practice with her girls' field hockey team, Karen said she would allocate *"more time on how we can defend this and get some good plays and how we can score and…move the ball. It's expanding on the concepts of open space, and the stuff I'm doing with teaching…but it's more complex I think."*

Teacher-Coaches' Epistemological Beliefs and Teaching and Coaching Instruction

Differentiating Instruction in PE

Despite some overlap, most of the teacher-coaches in this study did not teach games in PE the same way they coach sports. For example, Jillian indicated that when teaching games in PE she was *"open to almost any way to teach"* and Scott spoke about *"diversifying my style of teaching"* and relying more on "*direct versus indirect instructional changes."* He noted that he diversifies his PE instructional method primarily in response to *"understanding there are different types of learners in the classroom"* and to avoid *"being repetitive in the games and activities that I use in PE"* to enhance students' interests, motivations and learning needs. Karen added that, *"in PE class I try to make it a bit more individualized"* than when I coach, and I provide *"way more choice in the PE program."* to allow all students to be successful. As such, instruction of games in PE was less about the product of knowledge (e.g., game performance) and more about engaging students in the learning process.

Using Indirect Approaches in PE

While the teacher-coaches were largely the same "*person*" and "*personality"* in both their teaching games in PE and coaching sport roles, their belief that games knowledge derives more from multiple sources in PE than in sport prompted their use of more indirect instructional methods in PE than in their coaching where they relied almost entirely on direct instruction. In reference to teaching games in PE, the teacher-coaches used several indirect instructional approaches like *"self-directed learning"* (Brendan), *"inquiry-based learning"* (Scott), and the use of peer teaching and cooperative-learning opportunities. They viewed their roles in PE as being more of a facilitator of student learning rather than their dominant role in coaching sport as a knowledge and expert authority. For example, when teaching games in PE they were more *"hands-off"* (Scott), *"passive"* (Brendan), and encouraging of students to *"take ownership"* (Karen) of their learning. However, these same teachers were also prone to regressing back to a more traditional and familiar direct style of teaching games in PE often when there were safety and classroom management concerns. Brendan also admitted that *"there are too many days where you're just too tired…and you just kind of, you know, here's a game, get going…or rely on old-school things and just give them a drill."*

Drilling as Coaching

When teacher-coaches were asked to describe a typical practice for their school sport teams they all described it as being *"drill-based"* wherein students learned rules, skills, and strategies in isolation; whereas when teaching games in PE they did so using more modified game-play in order to facilitate experiential learning and understanding of "h*ow to control different [game] scenarios"* (Karen). For example, Jeff advised that, *"sometimes the drills are generic drills, but then we're going to do drills that obviously focus on a weakness that we may have had in a recent game."* The participants also believed that "*putting in the time and doing the repetitions"* (Jeff) was an important aspect of coaching student athletes and that they were not concerned about boredom or lack of engagement when coaching because the players "*want to be there"* (Jillian) and know that "*taking things to the competitive level is a choice you make as a team."* There was some differentiation in this however, as Jeff clarified that his overall coaching philosophy depended on what students were looking to get out of their sport experiences.

Discussion

Findings from this study support the existence of EB about the source and simplicity of knowledge that teacher-coaches deem applicable to games in their teaching of PE and/or their coaching of school sport. More specifically pertaining to the source of knowledge, the teacher-coaches in this study asserted that games knowledge can and should be observable and originate from external authorities such as them or expert peers. They also acknowledged the constructivist nature of learning that is specific to each learner (e.g., motivation, self efficacy, ability conceptions) and to the sociocultural context in which that learning occurs. This finding aligns with previous research (e.g., Hofer 2001; Hofer & Pintrich, 1997; Bendixen & Feucht, 2010) demonstrating the advantages and validity of teachers perceiving of multiple sources of knowledge. Among these are structuring the learning so pupils construct knowledge through social interactions (Muis & Duffy, 2013), differentiating instruction based on the content and using a variety of instructional approaches and facilitating learning *through* those sources (Cothran & Kulinna, 2006), addressing a wider variety of curricular aims such as higher order thinking skills (Harvey et al., 2010), and addressing the needs of more learning styles (Colquitt et al., 2017).

The findings of the current study also support that these beliefs about the source of knowledge and learning extend to the domain of coaching. For example, in addition to viewing themselves as knowledge expert and authorities when coaching, the sample acknowledged that student-athletes and peers also represent valid sources of games knowledge. This awareness may be related to the influence of their specific training and experience in PE teaching (Pierce et al., 2019) and to their more general epistemic beliefs about constructivist learning (Olafson & Schraw, 2010). Camiré et al. (2017) reported that PE teacher-coaches reported higher levels of coaching efficacy (perceptions of their ability to carry out various coaching tasks) than non-PE teacher-coaches. As such, PE teacher-coaches' higher coaching efficacy may leave them more 'open' to relinquishing some self-doubt and the need for control and to be the sole authority or knowledge expert so they can focus more on the psycho-social and learning needs of their student-athletes. Future research should continue to investigate the coaching beliefs and practices of non-PE teacher-coaches as they represent most of the teachers that coach in Canadian schools and may offer a different perspective than those trained in PE (Camiré et al., 2017).

The teacher-coaches' articulations of games knowledge as having both simple and complex aspects align with prior research demonstrating that individuals can hold what appears to be opposing EB about the simplicity of knowledge depending on the learning context (Beuhl & Fives, 2009). This sample's portrayal of games knowledge as simple, particularly in the case of their PE teaching practices, may reflect somewhat naïve or incomplete pedagogical and content knowledge that could have an adverse effect on student learning by creating an "simplistic" epistemic climate through their beliefs, classroom structures, and instructional practices (Muis & Dufffy, 2013). The teachers' simple knowledge beliefs could correspond to more superficial learning or scaffolding of learning (Rink, 2012) and more simplistic views about the nature of knowledge and learning in PE students (Lodewyk, 2015). Prior research supports that some PE students already hold inauspicious views that games and how they are taught are repetitive, over-emphasize competition and ability (Smith & Parr, 2007), and are somewhat meaningless in the context of their everyday lives (Garn et al., 2011). It would help if there was more agreement about *what* constitutes as knowledge in PE compared to other physical activity settings such as sports and if physical educators better understood the complex transferable cross-disciplinary content of PE and of games knowledge (Light & Fawns 2003).

The teacher-coaches' emphasis in this study on *participation* in both PE and extracurricular sports is supportive of inclusion for all, particularly as it relates to students that are often marginalized in PA settings (Garn et al., 2011). However, numerous studies support that 'incidental learning' and positive youth development are not inherent with merely participating in games (Pierce et al., 2019); and that, teachers and coaches need to actively implement strategies that foster important knowledge, skills, tactical decision-making, meaning, embodiment, and psycho-social and life skills (Quennerstedt, 2013). Learning complex movement skills and advanced game tactics appeared to the teacher-coaches in this study to be more fitting for school sport teams compared to PE which emphasized more of the simpler aspects of games knowledge such as basic rules and movement proficiencies. The study participants also differentiated their games instruction in PE by going beyond adopting and implementing various instructional strategies to assessing student readiness and modifying the learning process and environment to promote student success. As such, differentiated instruction is viewed more as a teaching 'philosophy' rather than a series of actions or behaviours enacted by a teacher (Colquitt et al., 2017). Although there are many appropriate uses of direct instruction (Grecic & Collins, 2013; Rink, 2012), the teacher-coaches' propensity to utilize direct instruction almost entirely in their coaching role may reflect its overuse (Edwards et al., 2016) and may limit the learning potential of some of their student-athletes. For example, sport participants have reported that a coach's inability or unwillingness to individualize their instruction based on the needs and learning preferences of specific players is indicative of poor or ineffective coaching (Gearity, 2012).

In conclusion, we acknowledge the limitations of this study that include a small sample size, the use of interviews as the sole method of data collection, and the interpretive nature of the data analysis that precludes generalization of findings across all secondary-school PE teacher-coaches. Despite these, this study provides new insights into the complex nature of teacher-coaches' beliefs within the specific contexts of their experiences and contribute to an understanding of the factors that influence teacher-coaches' teaching and coaching practices. teacher-coaches should critically examine their own practice (Christian et al., 2017) and the antecedents that inform their teaching and coaching practices such as their EB and interventions should consist of one-on-one mentoring, communities of practice, and formal coach education to facilitate more availing EB and practices (Olsson et al., 2017). Continued efforts to emphasize

constructivist approaches to knowledge acquisition in school-based sport and in PE may prove beneficial as numerous studies have reported on the unwillingness of PE teachers and coaches to implement new teaching despite knowing of their benefits (Harvey et al., 2010). This can be because they lack efficacy in their teaching/coaching and in their students (Jayantilal & O'Leary, 2017). Doing so could also ease the shared complaint of many students in PE that they learn the same 'basic' games and skills every year, which can lead to boredom, disengagement and negative perceptions about games and physical activity (Garn et al., 2011). We recommend incorporating other forms of data collection in a larger sample in future research to better understand PE teacher-coaches' EB and their planning, instruction, and assessment practices.

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