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Learning to teach: pedagogical content knowledge in adventure-based learning

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Background: Many alternative curricular models exist in physical education to better meet the needs of students than the multi-activity team sports curriculum that dominates in the USA. These alternative curricular models typically require different content knowledge (CK) and pedagogical CK (PCK) to implement successfully. One of the complexities of learning to teach these models for pre-service teachers (PTs) is understanding the different CK and PCK required which is compounded by their personal lack of experience of the model.

Purpose: The purpose of this study was to explore the PCK enacted by PTs learning to teach an alternative curricular model (adventure-based learning [ABL]) in urban middle schools.

Research design: Qualitative methods were used to explore how the PTs demonstrated their PCK while teaching an ABL unit to urban middle school students. The study took place at a major university and in three middle schools in a large urban school district in Midwestern USA.

Participants: Thirteen PTs enrolled in the secondary methods course and associated internship agreed to participate in this study. The PTs (five males and eight females) ranged in age from 21 to 26 years and all self-identified as white.

Data collection and data analysis: Three methods of data collection were employed in this study: interviews, daily reflections called critical friends, and stimulated recall reflection of teaching an ABL lesson. Data were analyzed using constant comparison. Trustworthiness was established through triangulation of the data using multiple data sources, peer debriefing, member checking, and negative case analysis.

Findings: Four themes represented the PTs' demonstration of PCK when learning to teach ABL in urban middle schools. The themes were (a) trusting the sequence, (b) knowing your students, (c) facilitate don't dictate, and (d) processing the experience. The findings provide further insight into the demonstration of PTs' PCK in secondary physical education, and specifically relative to teaching ABL in urban middle schools. To better equip PTs to be able to teach using these models, we recommend the following: (a) they have the opportunity to 'live the curriculum' in their PETE programme, (b) developing the PTs' specific CK and student-centered pedagogical knowledge for specific alternative curricular models is imperative in developing the PCK for such model, (c) developing PTs' knowledge of students relative to the complexities of learning to teach each specific model, (d) observing an expert teach the model to K-12 students, and (e) recognizing that learning to teach these models is

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a developmental process and providing the PTs with an emotionally safe and caring space to explore teaching such models is crucial.

Keywords: pedagogical content knowledge; physical education; pre-service teachers; learning to teach; adventure-based learning

Embarrassing, boring, irrelevant, and lacking personal meaning are among some of the terms that middle and high school students have used to describe physical education (Carlson 1995; Cothran and Ennis 2000; Ennis et al. 1997). If physical education teachers are to meet the needs of their students, they need to move beyond teaching within a multi-activity team sport curriculum. Criticism of this curriculum within US secondary schools has been well documented in the literature over the last two decades (Cothran and Ennis 1999; Ennis 2006; Locke 1992). Despite this criticism, the attractiveness of the curriculum still exists in US schools. While there are many alternative curricular models in physical education, they typically require a different knowledge base for successful implementation. Learning to teach alternative curricular models typically requires different content knowledge (CK) and pedagogical CK (PCK) from the multi-activity team-sport-based curriculum. Many of the alternative curricular models require a student-centered pedagogy, different CK and PCK. The stage of teacher development (Fuller and Brown 1975; Katz 1972) and knowledge of the learner are also important factors to consider when learning to teach alternative curricular models. In addition, another complexity of learning to teach alternative curricular models for pre-service teachers (PTs) is they may not have experienced them in their own in physical education (Sutherland and Stuhr 2012), and thus may not have a frame of reference for understanding the content and/or pedagogy required in the models. Understanding how PTs learn to teach an alternative curricular model that better meets the needs of students is an important contribution to the field of physical education. The purpose of this study was to explore the PCK enacted by PTs learning to teach an alternative curricular model (adventure-based learning [ABL]) in urban middle schools. The specific research questions guiding this study were the following: (a) What aspects of PCK did the PTs use in their ABL unit? and (b) How was this PCK similar or different from what the PTs were taught in their physical education teacher education (PETE) ABL course?

ABL has grown in popularity as an alternative curricular model in both the USA and UK. ABL has been described as a holistic student-centred curricular approach that can enhance personal behaviors and social interaction (Dyson and Sutherland, *in press*). ABL uses a deliberate sequence of activities (games, trust activities, and problem-solving activities) to focus on the personal and social development of students (Cosgriff 2000). Within ABL, the following key concepts are important to define to help facilitate understanding of the curricular model. *Sequence of activities* is the set of concrete activities outlined by the facilitator according to the theoretical development of the group (Tuckman and Jensen 1977). *Challenge by choice* is a strategy where students can choose their level of participation within an activity, thus creating a caring and emotionally safe environment for participation. This strategy is not a 'get out of jail free' card where the student can choose not to participate at any level in the ABL activities. *Full value contract* is a social contract, ideally developed collaboratively, that provides a framework for group members to guide their personal behaviors and interactions within the group (Dyson and Sutherland, *in press*). ABL is a process not an outcome-based curriculum model (Dyson and Sutherland, *in press*) and is grounded in the *experiential learning cycle*. Kolb's (1984) four-stage experiential learning cycle is the most widely used within ABL and consists of the

experience, reflection, generalization, and application stages. The experiential learning cycle is often used in the debriefing session that occurs after the experience in ABL in order for the participants to make meaning of the activity and to apply their learning beyond the experience to other areas of their lives. *Debriefing* is vital if experiential learning is to occur as it allows participants to construct meaning from their experience and learn to apply this meaning to other areas of their lives. Debriefing is best understood as guided reflection that is student-centered and guided rather than driven by the teacher (Sutherland, Ressler, and Stuhr 2011).

Research has focused primarily on the outcomes of adventure education or ABL (Brown 2006) and has just begun to explore the pedagogy of adventure education. Zmudy, Curtner-Smith, and Steffen (2009a) explored the task structures and ecology present within adventure education. They found that five task structures were present in two 7-day adventure camp experiences. The instructional, managerial, and social systems were similar to those previously identified within classroom, physical education, and adventure education settings. However, the exploratory and atmospheric systems were identified as being unique to adventure education and helped to support the instructional, managerial, and social systems. Thus, understanding these systems and successfully incorporating them into their programmes were important for adventure education facilitators to understand. Zmudy, Curtner-Smith, and Steffen (2009b) identified three different orientations that facilitators possess within adventure education: leisure orientation, outdoor pursuits orientation, and adventure orientation. The leisure orientation is concerned primarily with creating a fun and safe environment for play during the activities. The outdoor pursuits orientation focuses on teaching the activities that the participants are engaged in. The adventure orientation involves teaching through the activities and incorporating elements of experiential learning. Each of these orientations influences how adventure education facilitators interpret and use the pedagogies of adventure education, and there may be a developmental progression through the orientations from leisure to outdoor pursuits to adventure. Providing more early experiences, teaching adventure education to children was recommended for facilitators. Thomas (2010) explored the role of the facilitator in outdoor/adventure education experiences as they negotiate their role of managing group processes and providing instruction, leadership, and safety. The Mutual Learning Model (Schwarz 2002) was recommended as a model to help facilitators negotiate their varying roles in the outdoor/adventure experience.

Research exploring the pedagogy of adventure education or ABL within physical education is developing as these models are implemented within physical education and PETE programmes (Dillon, Tannehill, and O'Sullivan 2009; Sutherland, Ressler, and Stuhr 2011; Sutherland and Stuhr 2012). Dillon, Tannehill, and O'Sullivan (2009) found that two PTs in their study had difficulty teaching a full version of ABL in schools. The PTs failed to teach the full value contract, challenge by choice, or conduct a debrief during their units of instruction. Although the PTs were aware of the omissions, they were not concerned as the students were active during the lessons. Thus, in the face of teaching ABL to students, the PTs sacrificed core components of the model in favor of students being active. Sutherland, Ressler, and Stuhr (2011) also reported difficulty in PTs leading a meaningful student-centered debrief while teaching ABL to middle school students. The PTs indicated that they had a good understanding of the debrief and why it was important but had difficulty in facilitating a debrief with students. Simply put, their enacted PCK did not match their self-reported CK of the debrief process in ABL. Sutherland and Stuhr (2012) found in a study of PTs' reaction to implementing ABL that although the PTs faced student resistance to ABL, they had developed a foundation of CK and PCK in ABL to begin to counter this resistance. It should be noted that the focus of this study was not on the CK or PCK in ABL.

Pedagogical content knowledge

Content issues in the teaching-learning process have been the subject of research since Shulman's (1987) delineation of the teacher knowledge base. Constructs such as PCK have become increasingly embedded in the language and practice of teacher education programmes (e.g. Amade-Escot 2000; Tsangaridou 2002). Shulman (1986) defined PCK as the various methods teachers utilize to transform content and convey it to their students, resulting in students' understanding. Such methods could include examples, metaphors, and illustrations the teachers utilize to deliver their most regularly taught content. Thus, PCK is highly topic, person, and situation specific (Van Driel and Berry 2012), and incorporates a complex interplay of different knowledge bases: CK, PCK, knowledge of context, and knowledge of student. It is also important to understand that the development of PCK is not linear (Van Driel and Berry 2010) but rather is influenced by the relationship of these different knowledge bases. While acknowledging these complexities, this study will focus on the development of PCK, which serves as the conceptual framework.

Within ABL, PCK is methods the teachers use to facilitate the activities, adjust the sequence of activities, and lead the students through a meaningful student-centered debrief session. PCK not only integrates content with pedagogy, but also involves the teachers' knowledge of the learners (Shulman 1986). That is, the learners' background and their conceptions and misconceptions they bring to the learning environment. Specific to ABL it is vital that the teachers understand the level of the students' interpersonal and intra-personal development so they can plan the appropriate sequence of activities.

Research into PCK in physical education began in the early 1990s and involved pre-service (e.g. Chen 2004; McCaughtry and Rovegno 2003; Rovegno 1992, 1994, 1995; Sebren 1995; Tsangaridou 2002) and in-service teachers (Ayvazo and Ward 2011; Barrett and Collie 1996; Chen and Ennis 1995; Rovegno, Chen, and Todorovich 2003). Some studies compared pre-service and expert teachers (e.g. Chen 2002), and pre-service and novice teachers (e.g. Rovegno 1993).

The line of inquiry of PCK was primarily conducted in the natural settings, that is, elementary or secondary schools. Researchers examined how the participants' PCK emerged, developed, and was delivered to K-12 students (Amade-Escot 2000). The PCK of in-service teachers was described and analyzed in the context of their daily teaching practice. The PCK of PTs was investigated in the context of teaching practice (i.e. student-teaching internship) or learning-to-teach courses such as elementary or secondary physical education field-based methods courses.

Rovegno (1992), Sebren (1995), and Chen (2004) have examined how PCK develops during field-based elementary methods courses. Two primary findings resulted from these studies. First, the PCK of PTs evolved throughout these courses from general to more specific levels. PTs shifted from describing the content in broad terms to more specific and detailed information (Rovegno 1992). Subsequent to teaching experiences, the PTs attended more carefully to their students' comprehension and developmental levels (Chen 2004; Sebren 1995) and attained a more precise teaching plan that included what and how they wanted their students to learn (Sebren 1995). The plan used a stepwise progression that enabled the PTs to better match tasks to their students (Chen 2004; Rovegno 1992). The PTs were also more vigilant in their selection of words when delivering tasks to their students (Sebren 1995). The shift from the broad to more detailed levels of content signified an initial integration of different aspects of PCK (Chen 2004; Sebren 1995).

Second, despite the PCK growth, the PTs were limited in their ability to react appropriately to students' movement. They were not able to discriminate or analyze students'

performance, and therefore could not deliver accurate feedback (Chen 2004; Rovegno 1992; Sebren 1995) or appropriate learning cues (Chen 2004). The PTs' CK was not differentiated enough to enable a correct response to student performance (Rovegno 1992), which Chen (2004) attributed to inadequate CK.

Similar investigations on PCK development of PTs during field-based secondary methods courses are virtually nonexistent. A single study conducted by Jenkins, Garn, and Jenkins (2005) examined, as a primary question, what and how 37 PTs observed when serving as coaches during the secondary field-based experience. The PTs typically taught skill, movement, and health education. The PTs were paired with one teacher candidate teaching while the other engaged in peer coaching, which incorporated pre-conference, direct observation, and post conference. Similar to the studies in the elementary settings (i.e. Chen 2004; Rovegno 1992; Sebren 1995), Jenkins, Garn, and Jenkins (2005) identified increased knowledge and understanding of how learners respond as areas of growth for the PTs. Peer coaches, as a function of practicing observing their peers, were better able to consider whether a task was developmentally appropriate to a learner or to a class.

PCK develops with more acute observations of the learners and enhanced competency to match content to their abilities (Jenkins, Garn, and Jenkins 2005; Rovegno 1992). Alternatively, inadequate PCK is related to difficulties providing feedback, and inability to predict, discriminate, and analyze performance (e.g. Chen 2004; Rovegno 1992, 1995; Sebren 1995). The line of research in PCK within physical education has considered the development of PCK within a variety of contexts and subject matter. However, to date there are no studies that have considered enacted PCK in ABL. The nature of teaching content that focuses primarily on the development of interpersonal and intrapersonal growth and the transfer of this growth to other areas of life calls for a different enacted PCK. Thus, this study provides insight into the PCK of PTs learning to teach an alternative content area in physical education.

Method

Gaining insight into our own practice as PETE faculty was an important impetus for this study. ABL is one of the curriculum models used in the PETE programme at this university, yet to date we had not explored the influence of the PETE programme on the PTs learning to teach ABL. Qualitative methods were used to explore how the PTs demonstrated their PCK while teaching an ABL unit to urban middle school students. In particular, the focus was on the aspects of PCK the PTs demonstrated during the ABL unit. The study took place at a major university and in three middle schools in a large urban school district in Midwestern USA.

Context

The PTs took an ABL course taught by an experienced adventure educator within their PETE programme. The ABL course met twice a week for 1 hour 48 minutes per session for 10 weeks. The purpose of the course was to provide PTs with a foundation for building community among K-12 students and foster interpersonal and intrapersonal growth. The ABL course covered the theory underlying ABL, experiential learning, sequence and flow of ABL, interpersonal and intrapersonal skills, role of the facilitator in ABL, processing (brief, debrief, and transfer of learning), direct experience of ABL activities, and opportunities to facilitate ABL activities. The course provided the PTs with the opportunity to experience the content and pedagogy first hand, led by the course instructor who was an

experienced facilitator. The instructor highlighted the different pedagogies and CK during these sessions. On two different occasions the PTs facilitated an ABL session with their peers and received feedback from the instructor relative to their PCK. Eleven of the 13 participants in the study took, or were taking, this ABL course at the time of the study.

The PTs were enrolled in the secondary methods course taken in conjunction with a five-week internship in one of three urban middle schools. At each school site, there were 6–8 PTs who taught a 7-day ABL unit followed by a 10-day sport education soccer unit. The PTs taught small groups of students (8–12) during the ABL unit and had the opportunity to teach at least twice per day. The purpose of the smaller grouping arrangement was to allow the PTs to focus on content and facilitation skills (PCK) associated with ABL. The secondary methods course is taken during the last quarter prior to student teaching. At this point in the programme, the PTs have taught children in their adapted physical education course and their motor development course, and have engaged in a 100-hour field experience as part of their elementary methods course.

Participants

Consistent with the university's Institutional Review Board, each participant gave informed consent to participate in the study. The PTs (five males and eight females) ranged in age from 21 to 26 years and all self-identified as white. Ten of the 13 PTs had completed the ABL course at this university. One PT was taking the ABL course simultaneously with the secondary methods course. Two PTs had taken a course in adventure education at other universities. In the opinion of the PTs, these adventure education courses were not designed for physical education majors and did not emphasize how to teach ABL in K-12 schools.

Our role

The first author was a faculty member in the PETE programme, developed the ABL course, and taught the secondary methods course and internship during this study. The second author was a doctoral student in the PETE programme, taught the ABL course for the PTs in the study, and served as a supervisor for the internship course. The third author, an expert in researching PCK, served as a supervisor for the internship course.

To facilitate a more complete understanding and lucidity of the authors' roles in the process, it is important to disclose our positionality (Savin-Baden and Major 2013) relative to this study. We are strong proponents for the use of alternative curricular models within physical education, and in particular, ABL. The first author has over 25 years' experience facilitating ABL in a variety of contexts, is committed to the use of ABL in enhancing interpersonal and intrapersonal skills, and was a major influence in the introduction of ABL in the university PETE programme. The second and third authors experienced ABL as a curricular model within their doctoral programme. The influence of the authors on the research and participants cannot be overlooked. The authors' steps to attempt to reduce their influence on the research process will be explained later in the paper. The PTs were all aware of the authors' belief in ABL as a curricular model and their role both within the study and as the instructor and supervisors of the internship course, which may have influenced their participation in the study.

Ethical considerations

We recognize the ethical and moral issues in serving dual roles in this study, as the instructors/supervisors of the course and the researchers in this study. In particular in this study

there were obvious power dynamics between those responsible for assigning a grade for the course and those taking the course. We highlight this as a clear limitation to the study. To minimize the impact of this power differential on the PTs relative to their grade in the course and to reduce studentship behaviors (Graber 1991), the following steps were taken. The interviews were not conducted until the instruction and assignments for the secondary methods course had been completed. The course instructor (and first author) had oversight of the university supervisors and the PTs but was not directly responsible for the grades in the internship experience. The course instructor's role in assigning a grade for the internship course had been made clear to the PTs at the beginning of the quarter and again at the start of the internship experience. The second author did not interview PTs who he was responsible for assigning a grade for the internship experience. The data were not transcribed or analyzed until the completion of the quarter when all grades had been submitted.

Data collection

Three methods of data collection were employed in this study: interviews, daily reflections called critical friends, and stimulated recall reflection of teaching an ABL lesson. Data from all 13 PTs were used for the daily reflections and stimulated recall reflection of teaching an ABL lesson, but interview data from only seven participants were used as explained below.

Interviews: Seven PTs were interviewed during this study. Although all PTs consented to participate in the study, only seven agreed to participate in two face-to-face interviews based on their class schedules and other time commitments. No further measures were taken to recruit the PTs to participate in the interviews as the researchers clearly recognized the power differential in the situation and did not want the PTs to feel coerced into the interviews. Each interview was conducted using a semi-structured interview guide, lasted between 25 and 40 minutes, was audio taped with permission, and transcribed verbatim. The first interview took place during the first week of the unit and focused on questions pertaining to preparation in ABL, areas of strength and concern in ABL, PCK in ABL, PTs' learning related to ABL, teaching, and students. The second interview occurred after the end of the unit and focused on questions related to what the PTs learned about PCK in ABL, student response to the unit, understanding of the sequence of ABL, brief, debrief, and facilitation.

Daily reflections – critical friends: The PTs participated in daily reflections called critical friends. The purpose of the critical friends process is to engage small groups of PTs (3–4) in a critical reflection on a series of questions related to their experience teaching that day and how it would impact their future teaching. The focus of the questions was on what the PTs learned from their teaching in the following areas: students, planning, class management, instruction, ABL, and anything not previously covered. The process was facilitated by the PTs with some input from the university supervisors as necessary. The PTs completed a critical friends sheet based on their individual and group reflections on focus areas. The critical friends sheets then served as the impetus for changes in both content and pedagogy for the following lesson.

Stimulated recall of teaching an ABL lesson: Each PT used a videotape of one ABL lesson to reflect on the strengths and weaknesses of the lessons. The product from this experience was a two- to three-page reflection paper focusing on how the ABL activities were framed,

quality of the PT's facilitation, quality of the debrief, and student response to the activities and debrief.

Data analysis

Data were analyzed using constant comparison (Patton 2002). Each page of data was read separately prior to coding to ensure an overall view of the data corpus. The first author conducted the initial phase of the analysis in which the data were scrutinized and compared line by line and codes were assigned to each piece of data to help make sense of the data. A codebook was utilized to organize the codes and lead to the formation of initial themes. As the themes developed, each piece of data was constantly compared to other data to confirm or disconfirm the finding. Once this process was completed, the second author read the themes to confirm or question the findings. The third author, who is an expert in PCK, also read the themes from the perspective of the relevance to PCK.

In light of our positionality (Savin-Baden and Major 2013), we took the following measures to establish trustworthiness in this study. Triangulation of the data was determined by using both multiple data sources and multiple investigators in the collection, analysis, and reporting of the data. The sources included interviews, daily reflections, and reflection of teaching. Themes were cross-checked against all data sources multiple times and were accepted or rejected based on this evidence and interpretation. Multiple investigators allowed for the opportunity to reduce, or at the very least challenge, how our biases influenced the research process. Peer debriefing occurred on an ongoing basis throughout this study as a means to challenge interpretations of the data. Two colleagues familiar with ABL and qualitative research served as peer debriefers. Member checking was used for the interview data to allow the PTs to read the transcripts and comment on the accuracy of their interview. No additional data were added through this process as the PTs just confirmed that the transcripts were an accurate reflection of their interview. Negative case analysis was used to refine or revise tentative themes in the data (Patton 2002). This process helped to ensure that all aspects of the data were taken into consideration, not simply those that strengthened the themes. In particular, the PTs' not adhering to the sequence of ABL activities was considered as a negative case as it did not fit fully into the identified themes. However, this negative case allowed us to further understand the PTs' PCK in ABL.

Findings

The analysis of the data resulted in four themes that represented the PTs' demonstration of PCK when learning to teach ABL in urban middle schools. The themes were (a) trusting the sequence, (b) knowing your students, (c) facilitate don't dictate, and (d) processing the experience. The following codes were used to report our findings: first interview (I1), second interview (I2), critical friends (CF) followed by D# to reflect the day within the unit, and reflection of ABL lesson (ABL).

Trusting the sequence

The literature shows that the sequence of activities is one of the most important aspects of ABL instruction and that activities should be logically sequenced to meet the educational goals of the group (Bisson 1999). Within the ABL course the PTs were introduced to the importance of the sequence and were taught to use the following sequence of activities

in ABL: communication, cooperation, trust (emotional and physical), and problem solving. When implementing the ABL unit, most of the PTs expressed that the sequence was important. Amanda felt that sequencing was, 'the most important thing to have in your successful adventure ed[ucation] unit' (I2). Alan also discussed how important the sequence was and how it impacted group development, 'I think that it [sequence] is highly important ... watching other groups that didn't follow the unit exactly ... ran into instances later on where they would have name calling or put downs' (I2). Without a carefully planned sequence inter-/intrapersonal development and group cohesion can be negatively impacted. Instances where deviation from this sequence occurred caused problems for the PTs and hindered the development of interpersonal and intrapersonal relationships.

Despite understanding the importance of the sequence in an ABL unit, some of the PTs expressed concern relative to the area of trust within ABL. Ryan stated that he changed the order of trust and problem solving based on the students in his classes, 'I kind of got the vibe, like, I don't trust too many people in my life so it's kind of really, really hard for me to come in here and trust somebody doing these things' (I2). He felt his students 'were more apt to sit down and solve traffic jam than putting a blindfold on manoeuvring in and out of the obstacles' (I2). In essence, Ryan believed that his students were more likely to engage in problem-solving activities where they could work together such as traffic jam rather than put their trust in another classmate to lead them blindfolded on a Sherpa walk. This departure from the sequence used in the PETE ABL course and in the literature is supported by Schoel, Prouty, and Radcliffe (1988) who believed that, 'a good sequence for one group may not work for another. There is no exact formula' (77) and could be an indication of effective ABL PCK.

Other PTs recognized that trust was the most difficult area in the sequence, but they saw the value in building trust within their groups and so persevered with leading their groups through trust activities. Within the critical friends process during the days where trust activities were being taught, PTs commented on needing to continue to teach trust even though it was hard for some groups of students. David stated that, 'Trust is the toughest step of the group process to move through' and that it was important to, 'Take as much time as is needed' (CF D6). The fact that these PTs recognized the fragile nature of trust yet still persevered with the activities understanding that it takes time to build emotional and physical trust seems to indicate more growth in their PCK relative to sequencing ABL activities.

The concept of trust for the PTs was viewed almost entirely related to building physical trust rather than emotional trust. Not one PT included activities that emphasized emotional trust. In the second interview the PTs indicated the types of trust activities that they used in their units focused on building physical trust. By focusing almost exclusively on physical trust, the PTs did not provide their students with an opportunity to foster emotional trust, thus making it more difficult for the students to engage fully in the trust activities.

Within the PETE ABL course, the PTs were provided with a specific sequence of activities that moved from communication to cooperation to trust to problem solving when teaching ABL. During the teaching of the ABL unit however, some PTs began to recognize that the students are important with the teaching process and that understanding student development was crucial to the success of the ABL unit. Justin stated that the, 'order of activities should be flexible and that the order can be helpful to group performance or hurt group performance' (CF, D2). Colin realized the process of the sequence, 'is extremely important. There should be a reason to move from one to another' (CF, D5). The realization that providing students with a progression of activities related to the overall objective of the lesson and the functioning level of the group is a reflection of a higher level of PCK.

Knowing your students

The second theme was concerned with knowing the students and recognizing how each group is progressing in ABL. As the unit progressed many of the PTs reflected numerous times on the differences between their groups and how this impacted what occurred during the unit. David reflected on the group differences, 'My first group has problems cooperating and can't work together... My second group has come along great in working together... The first group will have to stay with the cooperation games longer, the second group seems ready for trust activities' (CF D4). Amanda stated, 'I had two groups that were 6th grade and they were totally different personalities... you really need to individualize your instruction and base it on knowing your students' (I2). The reflections of both David and Amanda indicate a high level of PCK in adjusting the sequence of activities based on the functioning level of the group. Amber, who felt confident in her ability to teach an ABL unit prior to the internship and had a group of students who did not respond well to the unit, seemed to learn greatly from the experience. She reflected in her second interview, 'We had to do so many communication activities that we never really got to any of the fun problem solving activities... it really does depend on your group how you move through this [ABL]' (I2). An excellent example of effective PCK in ABL relative to knowing the students was provided by Belinda,

I started them [each group] all off with the same instructions but as they progressed through the challenge I made different modifications to each of the groups depending on their strengths and weaknesses. Some groups would get through the steps very quickly so I had to continue to come up with more challenges. Other groups struggled through some of the steps so at times I had to modify the challenge for them a little, or give them hints and ideas. (ABL)

The PTs seemed to understand the importance of knowing when to move their groups on relative to the sequence of ABL. The key concepts the PTs identified were that 'the groups were communicating more' (Ryan I2), 'sharing ideas and listening to others' (Alan I2), and 'were accomplishing goals and not pushing each other around' (Alex I2). Candy based her decision of when to move through the sequence on one individual student, 'she was the one that I had to get in gear and she was the one that everybody else was kind of waiting on... Once she was ready, we were ready' (I2). The PTs also recognized that moving the students through the ABL sequence too quickly would cause problems within the group. David stated, 'trust and higher end [problem solving] activities should only be done when the group is ready. Groups can be very fragile if not moved along correctly' (CF D4). Amanda summarized the learning in the area of knowing the students in her second interview and when asked what she would change if she taught ABL again, she stated,

I would take the chance to look at my students you know the first day, second day and maybe gear my unit plan more toward that. I would see how they got along as a group, how they talked to each other, how they worked together and then decide on the activities based on where they were... try to make it more individualized. (I2)

The PTs recognized that they needed to assess where their group was, in terms of working collectively, in order to know what to plan and when to progress through the ABL sequence, which is an indication of effective PCK.

Facilitate don't dictate

Learning to allow the students to work through the activities rather than telling them how to do it was the third theme in this study. Allowing the students to work together to complete the activities represented a demonstration of PCK in ABL. Effective facilitation in ABL consists of the teacher explaining the objective and rules of the activity and then stepping back to allow the group to work through the activity and not try to solve it for them or tell them how to solve it. The teacher ensures the emotional and physical safety of the students and refocuses or redirects their efforts when necessary. The PTs reflected numerous times that learning to facilitate rather than dictate was an area of growth for them. For some PTs, this realization occurred early in the unit and may be an indication of more developed PCK. For example, on the second day of the unit Tracy reflected that she needed to, 'let the students work through the activity' (CF D2). For other PTs, the change between dictating and facilitating took longer to occur. Towards the end of the unit, these PTs progressed to explaining the activity and allowing the group to work through the process of completing the activity. Amanda stated on day six of the unit that, 'I gave them just enough information to understand what their task was and I let them figure it out as a team without my input. If I felt they were having problems, I would give a few verbal cues' (ABL).

On the other hand, Justin reflected that he was having trouble taking more of a back seat in the process, 'At times I should have given the students more freedom and less structure ... The sense to know when to sit back and let the students go is a learned skill' (ABL). Ryan also seemed to experience a struggle between how much information to provide to the students. He reflected in his critical friends that, 'When the activity is complex it should be demonstrated physically so all students see the process happen' (CF D3). As explained, while the use of demonstration would be considered good pedagogy in physical education, within ABL it may detract from the group working together to solve the activity, thus impeding the development of inter- and intrapersonal skills. There was a balance that the PTs needed to negotiate relative to the amount of information they presented to the students at the beginning of the activity. Some PTs demonstrated less effective PCK by providing too much information which detracted from the development of students' inter- and intrapersonal skills. Other PTs showed more effective PCK by explaining the objectives and rules of the activity and allowing the groups to work at solving the problem, stepping in to refocus the group when necessary.

Processing ABL

Processing ABL is related to the PTs' experience with using the brief and debrief with the students during the unit. The brief (also called framing) provides the purpose of the activity, thus situating the experience for the participants. The debrief can be considered the most important aspect of teaching ABL, but one that novice teachers find the most difficult to conduct (Sutherland, Ressler, and Stuhr 2011). It is during this process that the experience is reflected upon and learning is transferred to other areas of the students' life. The majority of the PTs experienced processing as both a participant and a facilitator during the PETE ABL course.

Some of the PTs felt confident in their ability to lead the brief and debrief with the students. Alan stated, 'I am more confident in my brief and debrief ... I felt very confident doing activities that are more problem solving, that have challenging outcomes 'cause with those I can use debriefing or briefing strategies throughout the lesson' (I2). Amanda did not take the PETE ABL course which she felt impacted her ability to lead an effective

debrief, 'I had no prior knowledge of what a debrief even was so I learned a lot about performing it through trial and error' (ABL). Other PTs felt confident in their ability to lead the brief but not the debrief. Candy felt that the brief 'was easy to plan' (I2) because for her it involved selecting and reading a quote that was related to the activity or lesson. Belinda echoed this sentiment but later in the unit reflected that, 'debriefs are harder than you think. Being sure that the true message is being brought across' (CF D5).

Leading the debrief was an area of concern for the PTs but one in which they experienced growth. The specific issues that arose were related to choice of questions, linking to the activity, transfer, and student reaction. Colin reflected that he needed to ask more specific questions in the debrief, 'I was sometimes too vague with my questions, and they [students] were not sure how to respond. When I was able to crack through with a question they understood, I was able to receive excellent answers' (ABL). The reflection by Colin indicated his progression in PCK relative to the debrief. As the ABL unit progressed Candy learned that the debrief, 'can go for a long time and the students can get more out of it if I ask the right type of question' (CF D6). Thus when the appropriate questions were used, the debrief was successful in relation to engaging the students in the process, demonstrating more effective PCK.

During the debrief some of the PTs had difficulty linking the brief, activity, and debrief. Amber felt that as she improved in this area it helped with the debrief process, 'I've actually used a quote to start class and I think that has helped in my debrief a little bit because it gives them something to think about' (I1). Amanda also reflected incorporating the quote (brief) at the beginning of the lesson helped her to understand the debrief process more, 'it's always good to start with a quote . . . and then tie that into your debrief and they'll [students] see why the quote was relevant to that activity and why that activity may have been relevant to things outside your life' (I1).

The PTs exhibited a range of PCK relative to the issue of transfer of learning to other areas of the students' lives. Joe demonstrated strong PCK, 'Many students talked about how they did not communicate early in the balloon activities and their performance suffered. Once they started communicating and coming up with a strategy, it was much easier to complete the task' (ABL). Students sharing one area in life where they can communicate better then followed this conversation. In contrast, Jason asked students to share one word about the activities during the lesson, 'The responses ranged from good, fun, to frustrated. We expanded on the frustrated comment, the student said that was how he felt at the beginning but then he felt really good when they completed the task' (ABL). It is uncertain whether the student learned from the experience as Jason's debrief process lacked questions related to the transfer of learning beyond the gym.

Discussion

The findings from this study indicated that as the unit progressed the PTs became more aware about who the learners were and how that factored into planning and teaching ABL. In other words, knowledge of the student, an area that Shulman (1986) identified as important in the development of PCK, was a key factor in teaching ABL. Within ABL, knowledge of the students is related to understanding the interpersonal and intrapersonal dynamics of each student and how they combine within the group setting. Similar to previous research (McCaughy and Rovegno 2003; Rovegno 1995), the PTs in this study experienced growth over the course of teaching the ABL unit in understanding the importance of their knowledge of the students. When teaching ABL to urban middle school students, the knowledge of the students was focused more on the affective domain than the

cognitive and/or physical domain. The majority of the PTs experienced some growth in understanding their students' levels of interpersonal and intrapersonal skills and the group dynamics.

Chen (2004) emphasized the importance of understanding the developmental levels of children when selecting instructional tasks as a salient aspect of PCK. Similarly, recognizing when the sequence needs to be changed based on the level of individual and group functioning is ABL PCK. Once faced with groups of students who, on the whole, had not previously experienced ABL but whose level of development relative to inter- and intrapersonal skills differed, the PTs realized that changes needed to be made to their lessons. The PTs in this study shifted from thinking that the same unit and lesson plans could be followed for each of the groups they were teaching, to realizing that they would need to individualize the lessons based on the uniqueness of each group and the group dynamics. These findings align with research that indicated the importance of teachers' knowing how to address student misunderstanding (Grossman 1990; Marks 1990) in order to move students forward in reaching desired outcomes. The findings echo previous arguments on improved PCK as a result of more closely observing students' performance and enhance ability to match instructional tasks to the students' abilities (Jenkins, Garn, and Jenkins 2005; McCaughtry and Rovegno 2003; Rovegno 1992).

Growth in knowledge of students is essential in PCK development in student-centred pedagogy that is used in ABL but may be difficult for PTs at such an early stage in their development as a teacher. The short duration of the field experience and, in particular, the ABL unit made it difficult for the PTs to gain in-depth knowledge of the students as learners. Coupled with the stage of teacher development or concern (Fuller and Brown 1975; Katz 1972) that these PTs were likely experiencing, where they were focused on themselves as teachers and surviving the experience, the small amount of growth in their knowledge of the students is understandable. The complexity of developing an in-depth understanding of the intricacies of knowledge of the students in learning to teach ABL may be too much to expect of novice teachers. Instead, it may be more useful to consider the growth of knowledge of the student in ABL as developmental. Thus as novice teachers learn to teach ABL, they develop their knowledge of the students from an initial understanding that each student is operating at a different level of interpersonal and intrapersonal development, which will in turn influence how they work in a group setting. In addition, the novice teacher will have an understanding of the process of group development and how it is related to ABL. As the novice teacher gains more experience in teaching ABL, they develop a more in-depth knowledge of the students and understand the interplay between interpersonal and intrapersonal development of each student, group development within each class, and the appropriate sequence of ABL activities.

The concerns from the PTs in this study regarding the inclusion of trust activities before problem solving indicated that these PTs were using their knowledge of the student to more appropriately sequence the activities, which illustrates effective PCK. The PTs changed the sequence based on their interpretations of student emotions in relation to trusting other students in their groups. This finding is in line with McCaughtry (2004) who found that understanding student emotions influenced teachers' selection and order of content and instructional strategies. In addition, the issue of not including activities which focused on emotional trust before physical trust as taught in the PETE ABL course warrants further discussion. Emotional trust is a difficult area for experienced ABL facilitators to teach. Although the majority of the PTs had experienced activities that focused on emotional trust during their PETE ABL course, it may be that they were not at a developmental stage in their teaching where they felt equipped to teach such activities within this

context. Alternatively, the CK and PCK needed to be able to teach the emotional trust activities and being able to recognize the stage of group cohesion necessary to engage in emotional trust activities may not have been present in these PTs.

The PTs realized during the internship that the selection of questions for the debrief was crucial in the success of the process. They learned that the questions needed to be more specific, probing, and guiding students in transferring the learning to areas of life outside of the gymnasium. The PTs with more effective PCK incorporated the ‘what, so what, now what’ cycle (Kolb 1984) often used within the debrief in adventure education. The PTs with less effective PCK experienced problems in planning and leading the debrief sessions. The specific areas where the PTs experienced difficulty were related to the types of questions used in the debrief, conducting a student-centred rather than teacher-directed debrief session, and helping students to transfer their learning beyond the gymnasium. The findings related to difficulty leading a student-centred debrief support the findings of previous research (Sutherland, Ressler, and Stuhr, 2011).

Conclusion

Alternative curricular models provide a much needed choice for PTs from the multi-activity team sport curriculum but require a different knowledge base which must be taught in PETE programmes. Learning to teach alternative curricular models that focus on student-centred pedagogy may not be easy, seem fraught with difficulties, and often require a different knowledge base in both content and pedagogy. To better equip PTs to be able to teach using these models and thus change the current state of affairs, which is necessary for the survival of physical education, we need to be more deliberate in how we prepare PTs. Clearly providing PTs with the opportunity to ‘live the curriculum’ (Oslin, Collier, and Mitchell 2001) is an important step in the process as it provides them with a frame of reference for understanding the intricacies of the alternative models. Focusing on developing the PTs’ specific CK and student-centred pedagogical knowledge for specific alternative curricular models is imperative in developing the PCK for such models. The significance of developing PTs knowledge of students relative to the complexities of learning to teach each specific model cannot be overemphasized. Understanding both the general and model specific knowledge of the students is central to learning to teach such models effectively. One way to assist in developing this knowledge is for the PTs to observe an expert teach the specific model to K-12 students and then engage in a reflective process that highlights how the expert incorporates his/her CK and PCK into his/her knowledge of the students. Recognizing that learning to teach these alternative curriculum models is a developmental process and providing the PTs with an emotionally safe and caring space to explore teaching such models are crucial. This space refers not to the school context in which the PTs teach, but rather the environment created through the interplay of the PETE programme, supervisors, mentor teachers, and PTs.

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