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Sustained Professional Development on Cooperative Learning: Impact on Six Teachers'
Practices and Students' Learning

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Abstract

Purpose. It has been argued, extensively and internationally, that sustained, school-based continuous professional development (CPD) has the potential to overcome some of the shortcomings of traditional one-off CPD programmes. Yet, the evidence-base on more- or less- effective forms of CPD is contradictory. The mechanisms by which sustained support should be offered are unclear and the impacts on teachers' and students' learning are complex and difficult to track. The purpose of this study was to examine the impact of a sustained, school-based, tailored and supported CPD program on teachers' practices and students' learning. **Methods.** Data is reported from six case studies of individual teachers engaged in a year-long CPD program focussed on Cooperative Learning. The CPD program involved participatory action research and frequent interaction/support from a boundary spanner (researcher/facilitator). Data were gathered from 29 video-recorded lessons, 108 interviews, and 35 field journal entries. **Results.** (a) Individualised (external) support, (b) departmental (internal) support, and (c) sustained support, impacted on teachers' practices of Cooperative Learning. The teachers adapted their practices of Cooperative Learning in response to their students' learning needs. Teachers began to develop a level of pedagogical fluency, and in doing so, teachers advanced students' learning. **Conclusions.** Since this study demonstrates impact, it contributes to international literature on effective CPD. The key contribution is the detailed evidence about how and why CPD supported six individual teachers to learn - differently - and the complexity of the learning support required to engage in on-going curriculum development to positively impact student learning.

Keywords: pedagogy, facilitator, models-based practice, physical education

Sustained Professional Development on Cooperative Learning: Impact on Six
Teachers' Practices and Students' Learning

Continuing professional development (CPD) is a key mechanism for teachers to learn and develop their practices to meet the complex and contemporary needs of young people (Armour, Quennerstedt, Chambers, & Makopoulou, 2015). Ensuring that teachers have access to effective CPD is, therefore, vital for the growth of teachers and students. It has been argued, extensively and internationally, that sustained, school-based CPD has the potential to overcome some of the shortcomings of traditional one-off CPD programmes (Cordingly et al., 2015; Vries, Jansen, & van der Grift, 2013). Grounded theoretically in the works of, for example, Dewey (1938) and/or Lave and Wenger (1991), key characteristics of effective sustained, school-based CPD are said to include: informal and formal learning experiences, inquiry and reflection, collaborative or community-based activities, and on-going support from an external facilitator (Armour et al., 2015; McLaughlin & Talbort, 2006). Yet, the evidence-base on more- or less- effective forms of CPD is contradictory. The mechanisms by which sustained support should be offered are unclear and the impacts on teachers' and students' learning are both complex and difficult to track (Armour et al., 2015; Cordingly et al., 2015; Kullinna, McCaughtry, Martin, & Cothran, 2001). Research that can measure the impact of sustained school-based CPD on teachers' practices and students' learning would generate new insights into the characteristics of effective CPD to inform the design and development of future CPD programs to ensure maximum positive impact.

The purpose of this paper was to examine the impact of a sustained, school-based, tailored, and supported CPD program on physical education (PE) teachers' practices and students' learning. The paper reports data from six case studies of individual teachers who were engaged in a year-long CPD program focussed on Cooperative Learning. The research question was as follows: *'What is the impact on teachers' practices and students' learning of*

a sustained and supported school-based CPD program on Cooperative Learning?

Supporting on-going curriculum development is a complex task, particularly when teachers approach curricula in different ways (Shawer, 2010). The local context, personal beliefs, students, teacher training, and a whole host of other factors influence teachers' practices (see Polikoff, 2013). As a result, external facilitators who introduce and intend to support the development of a new curriculum practices need to support teacher's individual needs (McLaughlin & Talbort, 2006; MacPhail, Patton, Parker, & Tannehill, 2014). As Patton, Parker, and Neutzling (2012) suggest, facilitators should move beyond a focus on teachers' knowledge and skills to focus on capacity building; encouraging teachers to be active seekers of knowledge, empowering teachers in the process of self-improvement, and helping teachers to focus on their learners' needs. Goodyear, Casey, and Kirk (2014) also argued that boundary spanners – for example, university-based researchers who cross their institutional boundaries to work with teachers in schools – need to support the development of school-based learning communities. It is not surprising then that reports of successful on-going curriculum development are often not found in generic, policy driven, large scale CPD programs (Armour et al., 2015). Research on introducing and sustaining Cooperative Learning provides a good example of these issues.

Cooperative Learning is a pedagogical model focused on students working in small groups in order to learn optimally (Joliffe, 2015). Johnson and Johnson's conceptual approach is a dominant way in which the model is used, internationally and across a broad range of subject areas (Dyson & Casey, 2012; Gillies, 2014). Through the conceptual approach, group work is organised so that students perceive themselves to be positively interdependent on their peers and learning occurs when students engage in promotive interactions (i.e., students facilitate and encourage each other's efforts) (Johnson & Johnson, 2009). Five elements are central to teachers' practices of Cooperative Learning when using

this approach (Figure 1) and a number of additional features support teachers in organising group work and learning; teacher-as-facilitator, developing heterogeneous groups, and using Cooperative Learning structures (e.g., Learning Together) (Dyson & Casey, 2012; Johnson & Johnson, 2009). Together, the elements and additional features, can be considered as the key features of Cooperative Learning (Figure 1).

Many CPD programs have been designed to support teachers to adopt Cooperative Learning and use the key features (Baines, Blatchford, & Webster, 2015; Brody & Davison, 1998; Dyson & Casey, 2012; Joliffe, 2015), with international and national programs evident through, for example, Kagan online or Teacher to Teacher UK Limited. CPD for Cooperative Learning has focussed on the development and provision of curriculum materials, in-house support, the development of professional learning communities, workshops, inquiry, and reflection (Brody & Davison, 1998; Joliffe, 2015; Pescarmona, 2015). The success of these types of CPD programs can be found in the meta analysis, reviews of literature, and best-evidence analysis of systematic reviews, that span over four decades and encompass over 2000 studies (see recent reviews, analysis, and summaries of previous reviews by Casey & Goodyear, 2015, Gillies, 2014 and Kyundt et al., 2013). This extensive evidence-base reports that Cooperative Learning enhances, strengthens, and improves student learning in physical, cognitive, social, and affective domains. Gillies (2014, p. 128) argued that the reported effect sizes for Cooperative Learning can make 'real-world differences' to student learning.

Despite extensive evidence of impact, and teachers' willingness to use the model, teachers face numerous challenges in sustaining and adapting Cooperative Learning (Baines et al. 2015; Joliffe, 2015; Pescarmona, 2015). In the UK, for example, the adoption of Cooperative Learning has been limited (Joliffe, 2015). Moreover, learning effectively in groups is relatively rare, and even when teachers do encourage students to work in groups, it has been reported that they rarely work together *as* groups and engage in promotive

interactions (Baines et al., 2015). More broadly, limited evidence exists on teachers' sustained use of Cooperative Learning and the impact on student learning across separate and related units of study (Baines et al. 2015; Kyundt et al., 2013; Fernandez-Rio et al., 2015).

The majority of evidence on Cooperative Learning to date relates to curriculum practice 'as-is' (Taylor, 2013, p. 304); in other words, teachers use a curriculum in one way, across one unit and follow the 'ready-to-use' package' of curriculum materials and resources they have been provided with during formal CPD experiences (Pescarmona, 2015, p. 38). It can be argued, therefore, that while effective CPD for Cooperative Learning may exist, the characteristics of CPD that impact on teachers' sustained practices of Cooperative Learning and, in turn, their students' learning, is less well-defined.

A rare example of success is reported by Casey in PE. Casey (2010), as a teacher-researcher, used Cooperative Learning over a seven-year period and simultaneously engaged in action research on his own practice. Casey reported that 'deeper learning' occurred when he developed a level of what he termed 'pedagogical fluency'. The concept of pedagogical fluency can be likened to learning a language; i.e. the shift from relying on a phrase book to responding and communicating with others at ease using the new language. Pedagogical fluency was defined as locating students at the heart of Cooperative Learning and thinking *within* Cooperative Learning to respond to students' emerging learning experiences. Although there are clear limitations to this self-reported success, it has also been found elsewhere that teacher action research on practice can be an effective form of CPD.

The pressures and expectations on teachers to respond to contemporary policy challenges and meet students' complex learning needs makes the search for effective CPD programs important. New evidence is needed on effective forms of CPD in order to unpack the characteristics of such programs and to ensure that teachers' professional learning can have maximum and positive impact on students' learning. This empirical investigation was

designed to contribute to the international research literature on the characteristics of effective CPD and provide empirical evidence on the student learning outcomes of teachers' sustained uses of Cooperative Learning.

Methods

Prior to data collection, university ethical approval was granted and informed consent was obtained from all participants. A case study design was adopted to provide a contextually grounded, holistic and detailed account (Stake, 2005) of the impact a CPD program had on teachers' practices and students' learning. A case was defined at the level of *an individual teacher and their differential engagement in the project with their students and the boundary spanner (researcher/facilitator) over one year*. There were six teacher cases in total, and all were from the same school, meaning that the cases shared important contextual features (the school, department, the boundary spanner and the CPD program). Beyond this commonality, the teacher cases were different in terms of career-experience, prior knowledge, and classes/activities taught. Contextual features and participants are now discussed and key details of the methods are provided in Figure 2.

Context

The school is a comprehensive secondary school in a small town in England, with students from predominantly white middle-class backgrounds. The school holds specialist sports college status (awarded by the Department for Education and Skills to raise the standards of PE). At the time of the study, the Office for Standards in Education (OfSTED; the UK government's inspectorate) ranked the school as 'satisfactory' which is a designation that signals the school requires enhancements.

PE is a compulsory subject with all students offered two hours (two x one hour lessons) per week. Prior to this study the curriculum was organised around a multi-activity model, with units lasting six lessons and taught through, predominantly, direct instruction. All six

teachers in the department participated in this study and had participated in previous studies with the author. The teachers were, therefore, familiar with the author and the curriculum leader contacted her for help in developing the department's use of Cooperative Learning.

The author is the boundary spanner. She was a previous teacher at the school who had taught PE using Cooperative Learning. In this study, she occupied a dual role of, (a) supporting teachers to develop their practice, and (b) gathering and analysing data on teachers' practices. By gathering data and engaging in an on-going analysis of teachers' practice throughout the study, she was able to design a CPD program that was contextually driven and offer support that was responsive to teachers' needs.

The school-based CPD program aimed to support teachers' learning and use of Cooperative Learning over one academic year. The programme was designed by the boundary spanner in three phases (Figure 2), and then modified in consultation with the department. Each phase was focussed on supporting teachers to use the key features of Cooperative Learning (Figure 1), through the teachers' engagement with participatory action research (PAR). PAR involved (a) *Dialogue* with each other and the boundary spanner, (b) *Analysis* of practice through individual reflection, and (c) *Negotiation* about practice with students during teacher-student interviews (Ax, Ponte, & Brouwer, 2008).

This paper reports data from phase three, although brief details on phases one and two are also provided to illustrate the depth of engagement with the teachers and to provide an important contextual background to the findings (Figure 2). Phase 3 occurred between 8-11 months of the CPD program and aimed to support teachers to use Cooperative Learning in contextually-driven and need supportive ways. A CPD workshop was led by the boundary spanner at the beginning of this phase and she asked teachers to consider: '*how can you give students more ownership and responsibility?*', '*how can your students be challenged more?*'. The teachers then used Cooperative Learning (focussing on the same classes taught as in

phase two see Figure 2) for a further two units of activity (i.e., the 4th and 5th units). Practice was supported by PAR and observations/discussions with the boundary spanner.

Participants: Case Study Teachers and their Students

The six teachers were qualified secondary school PE teachers. None had used Cooperative Learning prior to this study. The teachers varied in terms of gender, years of experience, and professional roles (Figure 3). Based on the teachers' experimentation with Cooperative Learning in phase one, each teacher selected one class (one teacher selected two) to use Cooperative Learning during with phases two and three. Seven classes of students were involved (162 students) in phase two and three; the classes ranged from year seven (age 11-12) to year ten (age 14-15). Each class was single sex and the average class size was 23. Pseudonyms are used for teachers and numerical codes are assigned to students.

Data Gathering

This paper reports data from phase three. Although the findings from phases one and two were interesting, they tended to reinforce the findings of previous research; for example, research focused on school-based CPD (McLaughlin & Talbort, 2006), CPD in PE (Armour et al., 2015), CPD for Cooperative Learning (see Joliffe, 2015), and teachers' practices of Cooperative Learning and students' learning (Dyson & Casey, 2012). The findings from phase three, however, can make a contribution to our current understandings of the types of CPD that encourage teachers to sustain their uses of Cooperative Learning, develop a level of pedagogical fluency and, in doing so, advance their students' learning. In total in phase three, data were gathered from 29 video-recorded lessons, 108 interviews, and 35 field journal entries. Each teacher case comprised of a minimum of four video-recorded lessons, 15 student and teacher interviews, and four field journal entries.

In most cases video recording took place in the first and last lesson of each unit. Extraneous and school-based factors, however, meant that different and/or additional lessons

were recorded. In each lesson, filming occurred from a fixed spot, in an unobtrusive position and the camera followed the teacher's movements. A wireless microphone, allowed for the sound to be captured specific to the teacher's position.

The Cooperative Learning Validation Tool (CLVT) (Casey, Goodyear, & Dyson, 2015) was used to analyze the video recordings. The CLVT is a way of determining model fidelity; model fidelity allows for an identification of whether the reported learning outcomes can be attributed to the educational intervention (Casey et al., 2015). Therefore, model fidelity is a means to authenticate whether students' learning can be attributed to teachers' uses of Cooperative Learning. The CLVT includes 17 categories of the key features (Figure 1), and an assessment of learning and student engagement/behavior. Similar to the approach of Dyson, Linehan, and Hastie (2010), systematic event coding (van der Mars, 1989) of each lesson ensured that each time a CLVT categories was observed it was recorded/noted. To ensure data gathered from the CLVT would be valid and reliable, following Brewer and Jones's (2005) recommendations, inter- and intra- reliability tests were completed by the boundary spanner and two external researchers. This process was repeated until the recommended 85% or above inter- and intra- reliability (van der Mars, 1989) was confirmed.

As part of the process of using the CLVT qualitative data, in the form of Validation Tool Field Notes (VTFN) (Casey et al., 2015), were taken. VTFN further document the degree to which model fidelity has been achieved (Casey et al., 2015). Taking VTFNs involved noting descriptions of the teaching and learning context and how a category had been observed, alongside transcriptions of teacher-student and student-student dialogue.

The interviews aimed to understand teachers' and students' interpretations of practice and learning. The following interviews took place: (a) pre- and post-lesson semi-structured interviews with teachers immediately prior to and following each video-recorded lesson (58 interviews of 3-10 mins), (b) post-lesson focus group (five members) interviews between

students and their class teacher (part of PAR) and between students and the boundary spanner (20 interviews of 5-10 mins), (c) pre- and post-unit interviews with teachers (12 interviews of 5-20 mins), (d) end of phase three interviews with each teacher (six interviews of 20-50 mins), (e) a minimum of one student focus group (five members) interview in each of the classes toward the end of the third phase (12 interviews of 15-40 mins).

The boundary spanner kept a field journal (FJ) and made 35 entries during the third phase. Key incidences, her observations of lessons, and informal discussions were noted.

Data Analysis

Analysis was ongoing in an iterative process throughout the study as the boundary spanner sought to interpret the data in order to respond to teachers' learning needs. At the end of the study, the data were analyzed *within* each teacher case. Qualitative data were coded inductively. The coded data were then grouped into categories according to the main elements of the research question: (a) the impact/effectiveness of the CPD support; (b) impact on the teacher's practices; and (c) evidence of impact on student learning. The next step was to determine whether relationships existed between (a), (b), and (c). The coded data were re-examined, therefore, to find out whether a particular aspect of the CPD support had influenced the use of the key features and if key features had influenced a certain type of learning (e.g. physical). For example, there appeared to be a relationship for one teacher between (a) guidance from the boundary spanner that (b) influenced him to use individual accountability (Figure 1) that (c) led to enhancements in his students' physical performance.

From the process of analyzing all individual cases and writing analytical memos, numerous links were observed between (b) impact on teachers' practice that was then reflected in (c) impact on students' learning. To 'test' this observation, cross case analysis was undertaken and the data coded in codes (a), (b), (c) were extracted from each case and compared across the cases. In all cases similar key features (Figure 1) were seen to support

social and physical learning. This meant that all teachers had used Cooperative Learning in a similar way to support students' learning. The types/forms of support from the boundary spanner, however, differed by case. For example, in one case a teacher used Cooperative Learning with limited support from the boundary spanner. In another case, a teacher actively sought the guidance of the boundary spanner. Consequently, two themes were constructed to reflect the similarities within the cases and the differences across the cases. The first theme, '*CPD support*', shows the differences in support from the boundary spanner that helped teachers to develop their practice. The second theme, '*teachers' practices of Cooperative Learning and student learning*' illustrates that while the types of CPD support differed, teachers' practices of Cooperative Learning and their students' learning were similar.

A final analytical process explored model fidelity using quantitative data from the CLVT. This was calculated by a mean percentage of all key features observed for each teacher's lessons and then calculating mean percentages across all video-recorded lessons (29 lessons). 95% indicated high model fidelity meaning that it is feasible to be confident that student learning could be attributed to the authentic use of Cooperative Learning.

Results

CPD Support

The teachers perceived that different forms of CPD support influenced their practices of Cooperative Learning (Figure 3). 'Harry', for example, claimed that it was the combination of PAR and the input from the boundary spanner that supported his practice:

Sharing resources, obviously the training we received, your input of how to develop lessons, and yeah generally the support and the discussions, discussing what happened in lessons, and working as a team (Phase 3 Interview)

Other teachers attributed impacts on their learning and practice either to PAR or solely to the boundary spanner (Figure 3). These differences could be explained by the

different ways in which the teachers practiced Cooperative Learning, the different types of support the boundary spanner provided for the teachers and/or that the different types of CPD the teachers sought – making this a complex picture. Indeed, although all teachers had a high level of model fidelity, variability in model fidelity demonstrates that teachers practiced Cooperative Learning in different ways (Figure 3). Differences in the type of support needed to facilitate different teachers needs became apparent when the teachers followed the boundary spanner's suggestions to develop students' learning, as noted in the researcher's FJ:

All teachers are experimenting with what they are doing.... they have responded to the questions that I posed to them during the meeting [CPD workshop], 'how can you give students more ownership and responsibility?' and 'how can your students be challenged more?' and they are being creative ...However, something which I have noticed is the need to re-focus my questions... For instance, during Liz's lesson I questioned her on each of them [the key features] to get her to consider how they could be enhanced.... [whereas with others] I have been supporting them to construct their own understandings for practice through my questions to them (FJ 20.4.12).

This high level of variability both in the ways in which individual teachers sought and made use of learning support, and the different ways in which the boundary spanner responded, is a key finding. As illustrated in Figure 3, this is a finding that highlights the sheer complexity of generic efforts to support teachers' professional learning 'effectively'.

The complexity of the professional learning process can be further understood by reporting more detailed data from two of the teacher case studies - Amy and Daniel – which illustrates the different needs of these two teachers even though both had received the same initial input. Amy, for example, could identify how she would challenge her students and how she would use individual accountability (Figure 1) to achieve her goals, and she could also anticipate the type of group contexts that would emerge:

My goal was to kind of put them in a scenario of things that needed to be changed...I wanted them to, not argue with each other, but get a little irate so that we have got stuff to go on... so I collapsed individual accountability ... because last lesson they were accountable for their own little thing so I wanted to see whether they could enforce it on their own...today they have all started to go, well she is not doing that and she is not doing this and they have started to see how important it is (Post-Lesson Interview Unit 4 Lesson 6).

Amy's comment that she purposefully 'collapsed individual accountability' is one explanation for Amy's relatively lower level of model fidelity in comparison to the other teachers (Figure 3). Amy attributed her developing practice to PAR - "you try little things out and see how they work" (Phase 3 Interview) – and the boundary spanner noted that "very little input came from me" (FJ 20.4.12). For Daniel, he achieved a higher level of model fidelity than Amy (Figure 3) yet the support provided by the boundary spanner was slightly different. Daniel sometimes struggled to identify ways in which he could use and adapt the key features to support student learning. The boundary spanner often shared examples from other teachers to help Daniel consider how the key features could be used.

Daniel: accountability has kind of gone out of that group, so they are happy but they are not being as constructive in their feedback

Boundary Spanner: could you change accountability and give them an additional form?

Daniel: [long pause]

Boundary Spanner: what Sean [another teacher Figure 3] gets them to do, they have to write down the points and they have a camera to observe to see if there are improvements

Daniel: yeah ok, so I need to put more accountability on them actually

communicating and them giving kind of practical tips. (Post Lesson Interview Unit 4 Lesson 6)

The boundary spanner provided more specific guidance to Daniel that was tailored to the ‘problems’ that he identified from within his practice. Daniel also identified that his students had different needs compared to Amy’s students, where the suggestion to include additional mechanisms for individual accountability may explain Daniel’s higher level of model fidelity (Figure 3). Daniel attributed his developing practice to the process of PAR within the departmental but also the individual discussions with the boundary spanner; for example: “well the discussions we [i.e. the boundary spanner] have and well I think that we are a strong department so we shared resources and we shared good practice” (Phase 3 Interview). To be effective in supporting these teachers to learn, therefore, CPD support had to be varied to meet their very different individual learning needs.

Teachers’ Practices of Cooperative Learning and Students’ Learning

In the CPD workshop, the boundary spanner’s suggestions for developing students’ learning (i.e. to provide students with more ownership and responsibility and to challenge their students) and the specific support she provided for the key features were evident in the way Cooperative Learning was practised. Central to teachers’ practices was positive interdependence, group processing, and individual accountability (Figure 1). These three key features influenced students’ promotive interactions and students’ social and physical learning.

Positive interdependence

In many observed classes, students were tasked with choosing how they would be positively interdependent on one another. Teams were asked to ‘develop and write down their own team goals’ (Daniel VTFN Lesson 6 Unit 4) and/or teams were ‘tasked with creating their own roles and responsibilities within their teams’ (Amy VTFN Lesson 1 Unit 4). The

reason for urging positive interdependence in this way was to encourage students to “all play a part in each other’s learning” (Jenny Pre-Lesson 1 Interview Unit 4) and to develop students’ understanding that, “I [a student] have still got to give feedback even though I [a student] haven’t really got that designated role” (Sean Pre-Lesson 4 Interview Unit 5).

When the teachers urged positive interdependence in this way, however, students were not engaging in promotive interactions. Arguments between students were observed and some groups failed to engage with learning tasks. As Amy described, students “were kind of reverting back to their old ways of talking over each other and having their own conversations” (Amy Post-Lesson Interview Lesson 1 Unit 4). In one lesson, a student said “everyone was arguing over batting because no-one had looked at the rules” (S1 Harry’s class VTFN, Lesson 2 Unit 4). While arguments did not occur in all groups, groups struggled to engage with the learning tasks. The teachers were frustrated because, for example, students were “just playing cricket” (Daniel Post-Lesson Interview Unit 4 Lesson 1).

Both the teachers and the boundary spanner, independently, came to an understanding that while students were tasked with choosing roles and/or goals many of the groups they had not engaged with this task effectively. The boundary spanner identified this through her analysis of teachers’ lessons and interviews with students and some of the teachers identified this through their observations of learning and/or interactions with groups.

Boundary Spanner: did you have roles?

S1: no not really

S2: we had a briefer person and someone got the equipment and a cameraperson

(Post-Lesson 1 Interview Unit 4)

“they have not outlined their group goals and they have not answered the question at the end...basically how are you each going to monitor and check that you have made improvements to somebody” (Daniel Post-Lesson 6 Interview Unit 4).

The following sub-sections highlight how the teachers used group processing and individual accountability in response to their students' challenges with organizing themselves to be positively interdependent. Reflective of the teacher's individual needs, some teachers adapted their practices of group processing and individual accountability without support from the boundary spanner. Other teachers, however, required more explicit guidance:

During group processing I am going to ask them what their individual roles were today in terms of organization and the extent to which they supported today's learning, so that will give them a little bit more focus as opposed to what went well and what could be improved. (Sean Pre-Lesson 4 Interview Unit 5)

I decided to type out his [Harry's] lesson structure and then provide an overview for his lessons on how he thought the key features were being achieved. The thought process behind this was for me to confirm with Harry my analysis as, firstly, there may have been something I had missed, but secondly it would allow a more open discussion and hopefully allow him to consider accountability himself... If he didn't recognize this, my plan was to ask him how they were accountable for achieving the group goal. (FJ 25.4.12).

Group processing

Group processing was used to develop students' understanding about how to be positively interdependent on one another. For example, prior to his class engaging with group processing, Sean said, "I want you to now reflect on your own role in today's session and whether you felt you were successful to allow sessions to take place, so think about your own role, what was it?" (VTFN Lesson 4 Unit 5). Focussing group processing on roles and goals encouraged some groups to begin "creating new roles" as they identified that, for example, "we need a different type of coach" (Amy VTFN, Lesson 2 Unit 4). Other groups, however, needed support from the teachers to identify strategies to improve group functioning.

S3: I think that maybe to improve we need to talk to each other more

S1: so communicate

All group members: yeah

Jenny: so do you think communication is coming up every week though, how are you going to change that, is that everyone doesn't communicate or?

S3: we have people that are leaders so maybe we should have leaders

Jenny: so maybe you are a group that decides at the beginning of the lesson who has leaders and then you rotate around so that everyone has a chance at leading.

All group members: yeah ok (Jenny VTFN Lesson 5 Unit 4)

As lessons and units progressed, students improved in their ability to work together.

The above group that Jenny spoke to during group processing in unit four suggested at the end of unit five that, "we self-chose [the roles], we basically had a leader for the day" (S1 End of Phase 3 Interview). Yet while the group had a "leader for the day" another member of the group commented on how they had organised themselves to be responsible for different aspects of tasks; dividing responsibilities was key to supporting each other's learning.

S2; well like before we were really unorganized and we weren't getting the stuff done

S3; yeah we talked over each other

S4; we argued

S2; but then the other week we got through a lot and helped each other loads... it is easier if we split off and then talk and then come back together. Because we are all focussing on one thing, you can like help each other... so I think that that is quite good to help us do it. (End of Phase 3 Interview)

From this comment it can be suggested that students began to develop an understanding that, in order for their group to function effectively, they needed to organise their group so that they were positively interdependent on one another and that this, in turn,

influenced their promotive interactions. The following group, albeit implicitly, furthers this point when they identified, during group processing, that positive interdependence and promotive interactions were a successful aspect of group work.

S1: they [the roles] are important for participating and creating the activity

S3: but doing it all together, it helps everyone

S4: because if there is someone who doesn't know everything that they need

S3: at least all of us can help them out. (VTFN Lesson 5 Unit 4).

The teachers' uses of group processing shows that the CPD program and support from the boundary spanner influenced the teachers to further adapt the key features to respond to their students' learning needs. Students learning was impacted by an enhanced understanding of how to engage in promotive interactions i.e. social learning.

Individual accountability

In some cases, students were provided with additional accountability measures to ensure they all contributed to tasks, used appropriate information to help each other learn, and/or they provided feedback to each other. For example, Harry described how he used "structured tasks where they each had to write down the key elements of my demonstration and then try and use them to help each other improve" (Post-Unit 6 Interview). Similarly, in Liz's lesson students were 'individually accountable for recording the content of their discussions on the sheet and then passing these round to each other' (VTFN Unit 6 Lesson 9). In other cases, or in different units, the Cooperative Learning structure, Student Teams Achievement Division (STAD), was used because of its perceived explicit focus on individual accountability. For example, the boundary spanner helped Daniel to consider using STAD for his fifth unit to assist him in improving his students' social skills and physical performance.

I wanted to improve the accountability so, like we mentioned, I picked on the STAD method, trying to improve their social skills, their kind of group interaction but also

for them to actually start to improve each other's practical ability. (Phase 3 Interview)

In Daniel's view, his decision to use STAD because of its focus on individual accountability was successful. Students were encouraged to interact with each other and their physical performance improved. This is seen through Daniel's comment on his practice and through an examination of how a group in his class was helping each other to learn. These comments show that individual accountability, therefore, influenced students' promotive interactions and enhanced students' physical performance.

They all had to chip in. They all had to obviously achieve their score, their distance or their time and then try and improve on it, because they realized that if they didn't, their team was going to suffer...what happened was that they were more focused...they helped each other...they needed that accountability of what they needed to do...and there has been a massive, massive improvement in their practical ability... accountability was the biggest plus. (Phase 3 Interview).

S1, S2, S3 then began practicing the throw [of the shot putt] with S2. S2, S3 and S4 [the person holding the resource card] were talking S1 through how to do it.

S2: okay so you kind of go down like that

S3: yeah you put it in your neck, elbow out

S4: you kind of go down like that [pointing to S3]

S2: and then you kind of step back twice and then throw

S1: I am still so confused

S2: well you try to kind of put that into a motion

S3: have a go and see. (Daniel VTFN Lesson 2 Unit 5)

At the end of the third phase most students commented on the ways in which they were now supporting each other's learning, and perceived that they had an increased level of responsibility for and ownership of their learning. While the comments made by the students

were stated in different forms and to differing intensities, in all focus group students' interviews at the end of phase three students commented on how their social skills were more developed: "we listen to our peers more and you pay attention to what everyone thinks" (S1); "we are more independent" (S2); "we are more in control" (S3). As these focus group interviews serve as a representative sample of all students' learning from all classes, the CPD program positively impacted teachers' practices and students' learning.

Drawing on Sparkes (1991), the CPD program impacted teachers' practices to a degree that the teachers were fully committed to Cooperative Learning. The following illustrative comment by Jenny shows that the teachers had identified ways to ensure Cooperative Learning was a central practice of the department. The CPD program, therefore, impacted each individual teacher's practices and the practices of the department.

Every unit now, people have gone off over the summer and we are redesigning our schemes of work. . .and we are having a Cooperative Learning box and people are giving example of what they could do and what [Cooperative Learning] structures they could use and what structures had been used in the past and then setting up a central resource. (Phase 3 Interview)

Discussion

Six in-depth teacher case studies have provided clear evidence of the positive impact from a sustained, collaborative, and in-situ CPD program. There is evidence of impact on teacher and student learning, and the processes and mechanisms that led to the outcomes.

Data from this study demonstrated that the following three characteristics were essential components of CPD that were impacted positively on teachers' practices and students' learning: (a) Individualised (external) support: ensured confidence in all teachers. Guidance and/or feedback from the boundary spanner, that was specific to each individual teachers' practice and students' learning needs, impacted on teachers' ability to act in needs

supportive ways; (b) Departmental (internal) support: from the other teachers engaged in using Cooperative Learning, that were from the same school, in the same subject department and across similar units of activity, facilitated the sustained use of Cooperative Learning. Resource sharing and discussions allowed teachers to identify how to use Cooperative Learning in different ways; (c) Sustained Support: external and internal was sustained and supported meets the diverse needs of the teachers. Sustained support allowed for a needs driven CPD program and for the teachers and the boundary spanner to identify areas of curriculum use to be developed to enhance student learning.

In examining practice and student learning in further detail, the three characteristics of CPD – individualised, departmental, and sustained - supported the teachers to develop pedagogical fluency. According to Casey (2010), fluency occurs when a teacher can routinely adapt their practices of Cooperative Learning to respond to students' learning needs. Data showed that the teachers adapted the key features of Cooperative Learning, namely, positive interdependence, group processing, and individual accountability in response to their students' learning needs. Students' social and physical learning were, consequently, impacted; the teachers developed students' promotive interactions, and in turn, students' social skills and their ability to learn and apply different movement patterns were advanced. These findings suggest that when CPD is individualised, departmental, and sustained, teachers' uses of Cooperative Learning can also be sustained and students' physical and social learning can be positively impacted.

The strengths of the CPD program can be explained by an analysis of learning theory. In particular, Dewey's (1938) notion of growth and Lave and Wenger's (1988) concept of situated learning. Dewey (1938) argued that education cannot be based on unquestionable truths or fixed standards since learning is an on-going process. Dewey (1938), consequently, advocated for the concept of growth to represent learning as the on-going process of constant

reconstruction of experiences. Lave and Wenger (1991, p. 31) proposed that ‘learning is an integral and inseparable aspect of social practice’. Situated learning refers to learning that occurs through experience within a social and cultural context (Lave & Wenger, 1991). The importance of learning being connected to *experience* within a *social context* was significant in this study. A key finding was the complex picture of variability in the ways, (i) Cooperative Learning was practiced, (ii) how different classes responded to Cooperative Learning, (iii) the CPD provided by the boundary spanner, and (iv) the type of CPD sought by the teachers. The CPD programme was successful because it accounted for such variability; the type of CPD accessed and provided was concentrated on the problems teachers encountered in their practice when they experienced Cooperative Learning in their classroom contexts and within the social context of the department. In other words, the CPD program was focussed on *experience* within a *social context*. A focus on fixed standards or fixed subject matter – as seen in many CPD programs (see Joliffe, 2015) - would not have catered for such variability and offers an explanation as to why many CPD programs have limited impact on teachers’ practices and student learning (Armour et al., 2015).

Dewey (1938) argued that the nature and the quality of experiences are also important factors in the development of growth. Continuity of experience was proposed to be of central importance and refers to bringing something from the past into current experiences in order to modify new experiences (Dewey, 1938). Lave and Wenger (1991) also advocated for continuity through identifying the need for sustained social engagement. Sustained social engagement was suggested to lead to trust and respect between individuals, where trust and respect act as key interpersonal mechanisms to prompt individuals to challenge each other and offer direction for further learning (Lave & Wenger, 1991). The quality of individualised (internal) and departmental (external) support was, therefore, strengthened because it was sustained. Sustained support acted as a key mechanism for teachers to make sense of their on-

going experiences with the support of other teachers and a boundary spanner who challenged their practices and offered direction for further learning.

Although this study demonstrated impact, there are limitations that should be acknowledged. Firstly, the researcher (or boundary spanner) was engaged in the study at numerous levels - as both an insider and an outsider. The boundary spanner gathered and analyzed data throughout the study and then re-analyzed her initial interpretations of the data (e.g., VTFN). Moreover, she had prior relations with the teachers. Despite this, attempts to meet Lincoln and Guba's (1985) notions of trustworthiness were made. The boundary spanner's contextual knowledge meets, to some extent, the notion of *credibility* (Lincoln & Guba, 1985) since her understandings of the school and teachers gained from working at the school, the previous practitioner research study, and the time spent in the school context in this study adds significant depth to the data. Indeed, as Dwyer and Buckle (2009) argue, insider role status can allow a greater depth of data to be gathered because a researcher often shares an identity, language, and experiential evidence base with participants that provides a level of openness and trust in the data gathering process. Teachers' assumptions of similarity and the boundary spanner's awareness of their context/practice, however, may have hindered data gathering and analysis. It has been reported that participants may fail to explain their individual experiences fully, and objectivity, reflexivity, and authenticity can be effected by the researcher becoming too close to the context and the participants (Dwyer & Buckle, 2009). To reduce the impact of this limitation, external researchers have added *dependability* (Lincoln & Guba, 1985) to the results through their on-going challenges to the interpretation of the data throughout the CPD program, during the analysis, and in the reporting of the findings. The results section also showed *credibility* (Lincoln & Guba, 1985) through the triangulation of data from the multiple data gathering sources. It should be acknowledged, however, that the boundary spanner was both a strength and weakness of this research.

Another limitation was the method used to video-record lessons. The camera view and sound were only specific to each teacher's movements. This meant that, at times, an on-going interpretation of a group's learning may not have been captured in a lesson or over a series of lessons. The interpretation of learning is, therefore, based on an overall assessment of the generic understanding of all students in a class. It should also be acknowledged that no baseline measures were taken of student learning to measure change or impact. The study has, however, collected multiple forms of data and reports on teachers', students', and the boundary spanner's analysis and interpretation of learning changes. Despite this, only physical and social learning were reported on, which is in contrast to accounts that Cooperative Learning can successfully promote student learning in physical, cognitive, social and affective domains (Casey & Goodyear, 2015). While this may have been related to the research question and attempts to track a direct relationship between (a) CPD, (b) teachers' practices, and (c) student learning, future studies should employ methods to track on-going changes to an individual group's learning that can measure learning in physical, cognitive, social, and affective domains.

What does this article add?

Due to limited evidence on effective CPD, this study set out to consider the characteristics of CPD that impact on practice and student learning. The findings show that, (a) individualised (external) support, (b) departmental (internal) support, and (c) sustained support, impact on teachers' ability to adapt their practices of a curriculum, and in doing so, advance students' learning. Key implications have emerged about the actions of external facilitators in CPD programs and how they should be attentive to teachers' individual needs. If CPD programs can address the complex and individual needs of teachers, when teachers use pedagogical practices like Cooperative Learning, the potential for education to make 'real-world differences' (Gillies, 2014, p. 128) to student learning could be furthered.

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