

A Professional Development Program to Enhance Primary School Teachers' Knowledge and Operationalization of Physical Literacy

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Introduction: Despite increases in research and implementation, physical literacy continues to be largely misinterpreted by practitioners. The purpose of this study was to devise, implement, and evaluate a professional development program that works in a primary school environment to enhance their knowledge and operationalization of physical literacy. **Methods:** Following a 3-month needs assessment phase, data were collected from structured observations, reflections, and semistructured interviews with the teachers, before, during, and after an introductory workshop and 6-month physical literacy intervention. Thematic analysis was used to evaluate perceptions of program effectiveness. **Results:** The needs assessment phase identified notable differences between teachers' classroom and physical education practice. Results of the physical literacy workshop and intervention detailed an increase in teachers' knowledge of, and operationalization of, physical literacy. **Discussion/Conclusions:** Applying established principles of effective professional development in a contextually sensitive manner was viewed as effective in enhancing primary school teachers' knowledge and practice regarding physical literacy.

Keywords: PE-CPD, physical education, primary education

Despite the increased interest and attention around the concept of physical literacy on a global and political level (Dudley, Cairney, Wainwright, Kriellaars, & Mitchell, 2017), it continues to be largely misinterpreted by practitioners, including school teachers (Edwards, Bryant, & Jones, 2015). A systematic review conducted by Edwards, Bryant, Keegan, Morgan, and Jones (2017) revealed that the majority of studies (70%) adopted a "Whiteheadian" definition of physical literacy. Whitehead's definition was founded on the philosophical groundings of phenomenology, existentialism, and monism and is defined as "the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life" (International Physical Literacy Association, 2016, para. 1). Recent developments have placed an emphasis on the social capability alongside the physical, affective, and cognitive domains of physical literacy (see Keegan et al., 2019). An in-depth critical discussion of the philosophical foundations of physical literacy is beyond the scope of the present study (see Pot, Whitehead, & Durden-Myers, 2018). Nevertheless, practitioners should be aware of the key foundations that underpin the philosophy of physical literacy in order further understand how to operationalize the concept in practice (Shearer et al., 2018). Even so, there have been many debates around how best to operationalize the complex, multifaceted, and nonlinear concept of physical literacy (Durden-Myers, Green, & Whitehead, 2018; Edwards et al., 2018).

Although physical literacy is relevant throughout the life course, currently, school-based physical education (PE) lessons have been recognized as the most common environment in which children and adolescents can develop their physical literacy (Edwards et al., 2018). In this context, many advocates consider physical literacy as the main outcome of high-quality PE provision to generate healthy, able, and active citizens (McLennan & Thompson, 2015). For most children, PE is their first encounter of structured physical activity, therefore positive, high-quality experiences of physical activity should be nurtured in primary schools (Kirk, 2012). Such positive experiences are engendered by teachers delivering high-quality PE lessons (Penney, Brooker, Hay, & Gillespie, 2009). High-quality PE can be achieved when the curriculum, pedagogy, and assessment are successfully integrated and aligned (Bernstein, 1977). Indeed, solely considering the content of the curriculum is not sufficient to provide a quality educational experience for pupils (Penney et al., 2009). Research indicates that primary teachers' insecurities are partially related to limited content knowledge, but primarily they are due to pedagogical concerns (Harris, Cale, & Muson, 2012). These insecurities are unsurprising given that 40% of generalist primary school teachers in the United Kingdom receive less than 6 hr of PE training during their initial teacher education and training (Blair & Capel, 2008).

Limited PE content knowledge and lack of training opportunities impair teachers' abilities to plan lessons effectively with many primary teachers omitting PE lesson planning altogether (Sloan, 2010). Consequently, primary school teachers who lack confidence in teaching PE are less likely to deliver high-quality PE, and in turn, less likely to impact positively on pupils' physical literacy (Taplin, 2013). The primary school age group (aged 4–11 years) is viewed as a critical period in the development of physical

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literacy and healthy behaviors (Larouche, Laurencelle, Shephard, & Trudeau, 2015), rendering primary school teachers' limited knowledge and operationalization of physical literacy problematic (Cale & Harris, 2018; Robinson, Randall, & Barrett, 2018). The above-identified shortfalls in knowledge and implementation can be mitigated via effective professional development programs (Hunzicker, 2011).

Professional Development Programs

In teaching and education, professional development programs provide feasible opportunities for teachers to develop and refine high-quality teaching practice in an ever-changing and multifaceted profession (Phillips, 2008). Specifically, professional development programs in PE (PE-CPD) can play a considerable role in upskilling content knowledge and reducing primary school teachers' insecurities toward teaching PE (Harris et al., 2012). Nevertheless, like most PE-CPD programs, they have a tendency to be brief, 1-day workshops that occur off the school site (Jess, McEvilly, & Carse, 2017). Although workshop-based training can be useful in relaying large amounts of information in short periods of time, it is known that content covered during brief, "one-shot" workshop-based professional development programs are considered to be superficial and less effective (Hunzicker, 2011).

Teachers often question the value of the one-off courses and are usually "passive consumers" as opposed to actively engaging with their development (Armour & Yelling, 2004). In this context, many workshop-based PE-CPD programs do not embed the content alongside teachers' current responsibilities, nor are they supportive and consider teachers' individual needs. To overcome these shortcomings, O'Sullivan (2002) proposed that initial stages of CPD programs should commence with a needs assessment phase. A "need" describes "a desire to improve current performance or to correct a deficiency" (Barbazette, 2005, p. 5). In turn, the needs assessment phase is crucial as it avoids generic learning opportunities, focuses on teachers' growth, and nurtures them as learners (Armour, Quennerstedt, Chambers, & Makopolou, 2015). An emphasis on teachers' "growth" can be supported by creating a collaborative environment and allow opportunities for teachers to work with peers, provide and receive feedback and share good practice (Hunzicker, 2011).

Often, PE-CPD programs, particularly with primary schools, focus on upskilling teachers' PE content knowledge and offer resource materials as a mechanism to support their learning (Armour & Yelling, 2004). However, resource-driven professional development programs do not adequately provide teachers with an in-depth knowledge base and they are unlikely to be impactful at a national level (Atencio, Jess, & Dewar, 2012). Instead, PE-CPD programs should upskill teachers' content knowledge and pedagogical practice in PE to ensure the professional development program is instructionally focused (Hunzicker, 2011). In the context of PE-CPD with a focus on physical literacy, consideration for the complex and nonlinear nature of the development of the concept is required (Edwards et al., 2018). Many PE-CPD programs do not account for the complexity of the learning process, understand the context and contemporary theory, or support the bridge between theory and practice (Armour et al., 2015). This concern is heightened in primary schools whereby generalist teachers do not commonly specialize in PE in the United Kingdom, hence, requiring effective and long-lasting professional development opportunities.

In respect of the literature, nine key principles of effective professional development in PE and physical literacy emerged, specifically:

- (a) Begin with an in-depth needs assessment consultancy process to evaluate the individual needs of the school and the teachers (Hunzicker, 2011; O'Sullivan, 2002).
- (b) Consider the complex and nonlinear nature of the development of physical literacy (Edwards et al., 2018).
- (c) Create a supportive environment and tailor the professional development program to the needs of the teacher, school, and local authority goals (Hunzicker, 2011; O'Sullivan, 2002).
- (d) Embed the content of the professional development program alongside teachers' current job duties and responsibilities and encourage teachers to reflect continually on the learning process (Hunzicker, 2011).
- (e) Upskill teachers on content knowledge and pedagogical practice in PE to ensure the professional development program is instructional focused (Hunzicker, 2011).
- (f) Focus on teachers' "growth" and nurture them as learners and bridge the theory–practice gap (Armour et al., 2015).
- (g) Create a collaborative environment (Hunzicker, 2011).
- (h) Place an emphasis on sustainability and avoid one-off training opportunities such as workshops (Atencio et al., 2012; Hunzicker, 2011).
- (i) Do not rely solely on resource material as resource-driven professional development programs do not adequately provide teachers with an in-depth knowledge base and they are unlikely to be impactful at a national level (Atencio et al., 2012).

Purpose

The purpose of the present study was to devise, implement, and evaluate a professional development program that works in a school-based environment with Welsh-medium primary school teachers. The present study explored how the aforementioned professional development program modified teachers' knowledge and operationalization of physical literacy. This study was part of a wider research project funded by the *Coleg Cymraeg Cenedlaethol* (Welsh National College).

Methods

Sampling and School Selection

Following institutional level research ethics committee approval, a purposive sampling procedure was employed to select the schools for this study (Patton, 2002). Specifically, Welsh-medium schools were selected because it was a key requirement of the funding body, the *Coleg Cymraeg Cenedlaethol*. Written informed consents from two head teachers and three primary school teachers were collected to allow participation in the study. Furthermore, Year 6 (fifth grade) pupils in their final year of primary school (aged 10–11 years) who received two 1-hr PE lessons per week were the key focus of this study, given that physical literacy should be nurtured in primary before transitioning to secondary school (Zeedyk et al., 2003).

Two primary schools from different socioeconomic demographics across South Wales, United Kingdom were recruited through e-mail contact with the respective head teachers. These

two different schools provided an authentic context for the complexity and uniqueness of these individual demographics; hence, they were selected for this purpose. The schools in this study are subsequently referred to as the “urban school” and the “rural school.” The urban school was based in a metropolitan area, whereas the rural school was based in the South Wales Valleys, a group of postindustrialized valleys in South Wales. Notable differences between the two schools included the percentage of pupils eligible for free school meals, the number of Year 6 pupils enrolled in each school, the number of Year 6 classes per school, and the number of Year 6 teachers per school. Table 1 summarizes the characteristics of both schools.

Professional Development Program

A professional development program to enhance Welsh-medium primary school teachers’ knowledge and operationalization of physical literacy (PDPL) was designed and implemented in the academic year 2014–2015. Throughout the PDPL, the principle investigator (PI) was based in each primary school for 2 days per week. The research design consisted of three phases: (a) needs assessment (September–December 2014), (b) physical literacy workshop (January 2015), and (c) physical literacy intervention (January–July 2015).

Phase 1. A 3-month qualitative needs assessment phase with no intervention was conducted in order to observe teachers’ knowledge and operationalization of physical literacy as well as assess their confidence and competence in teaching PE. This phase

identified the teachers’ everyday behaviors through structured observation of their teaching practice in both classroom and PE lessons (see Table 2). Needs were identified for each teacher based on the observations (2 days per week) and were addressed in Phase 3. Before commencing with Phase 2 of the study, the teachers were interviewed individually for approximately 40 min using a semi-structured interview guide to characterize their knowledge and understanding of physical literacy.

Phase 2. A 1-hr workshop took place in January 2015 which aimed to upskill teachers’ knowledge on the definition of physical literacy through interactive tasks. First, the workshop highlighted the importance of physical literacy in the form of a lecture (e.g., developing the whole child). Second, various examples of physical literacy in international policy were shared with teachers, placing emphasis on its increased popularity. Third, teachers were asked to write their definition of physical literacy which naturally stimulated discussion around some common misconceptions (Edwards et al., 2015). Fourth, the definition adopted by the International Physical Literacy Association was shared with teachers, which included explanations of the physical, affective, and cognitive characteristics and the physical literacy journey (Edwards et al., 2017). Finally, teachers were asked to draw their own physical literacy journey.

Phase 3. After the workshop, a 6-month physical literacy intervention was conducted with the Year 6 teachers (January–July 2015). The nine principles of effective professional development

Table 1 Demographic Data for Both the Primary Schools

	City school	Valleys school
Number of pupils enrolled	206	450
Percentage of pupils eligible for “free school meals” (EFSM)	2.4	24.7
Age range, years	4–11	3–11
Number of Year 6 pupils	28	40
Number of Year 6 teachers	1	2
Teacher pseudonym	Mrs. Davies	Mr. Rogers and Mrs. Jones
PE specialist/nonspecialist	Nonspecialist	Mr. Rogers—PE specialist Mrs. Jones—nonspecialist
Years teaching	23 years	Mr. Rogers—3 years Mrs. Jones—20 years
Favorite sport/physical activity	No dominant sport	Mr. Rogers—rugby Mrs. Jones—squash

Note. PE = physical education.

Table 2 Structured Form Used to Observe Teachers

Curriculum	Curriculum	Physical Aspect of the classroom
What is taught? (content)	How is it taught? (teaching strategies / resources)	
Rapport between teacher and student	Other personnel: support staff /parent helpers	Other
Teacher behavior	Student engagement and behavior	TARGET structure: Task Authority Recognition Grouping Evaluation Time

Adapted from *Targeted School Self-Evaluation Improvement Team (TSSEIT) evaluation tools support materials*, by N. Brito, 2009, Bankstown, Australia: Department of Education and Training.

were implemented in the physical literacy intervention. For example, the physical literacy intervention embedded teachers' individual needs identified in Phase 1 and was considered collaborative and supportive as the PI conducted flexible weekly collaborative discussions (approximately 20 min) with the teachers to plan and reflect on their PE lessons. Weekly collaborative discussions were dialogic, and the content and pedagogy of the previous PE lessons were embedded into discussions. This embedded process was accomplished by concentrating on one curriculum focus (e.g., activity-specific practice and content knowledge) and one pedagogical focus (e.g., differentiating the tasks) every week. Throughout Phase 3, the teachers were central in the decision-making process and ultimately the PI's role was to support them during the planning for PE lessons and empower them to make decisions about PE lessons. The intervention was instructionally focused as the weekly collaborative discussions with teachers centered on the curriculum (what was taught), pedagogy (how it was taught), and assessment (impact on pupils' learning), in order to develop pupils' physical, affective, and cognitive domains of physical literacy (Bernstein, 1977; Penney et al., 2009; Whitehead, 2010). Further to discussing PE lessons, the collaborative discussions occasionally focused on how teachers could develop physical literacy within other areas of the curriculum. This included collaboratively discussing opportunities to develop pupils' knowledge and understanding of healthy and active lifestyles in other subject areas (Edwards et al., 2017). At the end of Phase 3, the semistructured, 40-min individual interviews focusing on teachers' knowledge and understanding of physical literacy were repeated such that the pre- and postintervention interviews could be compared.

Data Sources and Analysis

A range of qualitative research sources was utilized throughout Phase 1 and Phase 3, to include: notes taken during the lesson observations of PE lessons (Brito, 2009) and reflections (Gibbs, 1988), weekly reflective collaborative discussions with the teachers to plan high-quality PE lessons, and semistructured interviews with the teachers about their experiences before and after the intervention (see Appendix 1). The interviews audiotaped and subsequently transcribed for purposes of analysis. Before qualitative analysis procedures began, back translation was conducted from Welsh into English for accuracy and interpretation (Duda & Hayashi, 1998). For the back-translation process, the PI translated the transcripts from Welsh to English, and then the second investigator translated the English version back to Welsh. Both translators then compared the original Welsh version and the retranslated version, and the process continued until semantic similarity was achieved (Duda & Hayashi, 1998).

Deductive and inductive thematic analyses were performed using six phases of analysis, specifically: (a) familiarization with the data, (b) generating initial codes, (c) searching for themes, (d) reviewing themes, (e) defining and naming themes, and (f) producing the report (Braun & Clarke, 2006). The PI generated initial codes deductively and the theoretical/deductive thematic analysis was driven by the knowledge and operationalization of physical literacy. Trustworthiness was addressed in accordance with Lincoln and Guba's (1985) criteria: credibility, transferability, dependability, and confirmability.

Results

Two major themes were identified based on the deductive analysis of the lesson observations, reflective discussion collaborations, and

interviews: *Knowledge of Physical Literacy* and *Operationalizing Physical Literacy*. Subthemes with these two major thematic categories will be presented in this section.

Knowledge of Physical Literacy

Three subthemes evolved from the theme, *Knowledge of Physical Literacy*. The first subtheme, *understanding the physical literacy definition*, derived from nine of the lesson observation notes, 16 of the collaborative reflection sessions, and three of the teacher interviews. Six examples have been selected to describe this subtheme. The second subtheme, *PE-specific knowledge*, derived from seven of the lesson observation notes, 13 of the collaborative reflection sessions, and three of the teacher interviews. Five examples have been selected to describe this subtheme. Finally, the third subtheme, *recognizing the importance of PE*, stemmed from four of the lesson observation notes, 10 of the collaborative reflection sessions, and three of the teacher interviews. Six examples have been selected to describe this subtheme.

Understanding the physical literacy definition. The first subtheme was related to the growth in the three teachers' understanding of the concept of physical literacy. As the literacy coordinator in Key Stage 2 (aged 7–11 years), Mrs. Jones' initial definition of physical literacy "was related to literacy in a PE or physical activity context" (reflection from the workshop). Similarly, Mr. Rogers alluded to developing literacy skills in his preliminary definition of physical literacy: "they [pupils] are able to use correct language to describe what they do and what effect it has on the body" (preintervention interview). In contrast to physical literacy, literacy in PE refers to developing the skills of speaking, listening, reading, and writing in PE lessons (Department for Education and Skills, 2002). Furthermore, Mrs. Davies's initial understanding of physical literacy indicated some common misconceptions of the concept (Edwards et al., 2015, 2017):

I'm going to be quite honest, when I first heard the term, I thought, "oh dear, what's this term now?" There are so many terms thrown at us all the time! There's certain physical skills and also that they [pupils] are more aware that literacy and numeracy are important and keeping fit is also important for a healthy lifestyle in the future. (preintervention interview)

Despite some misconceptions, Mrs. Davies made the connection between healthy lifestyles and physical literacy, demonstrating an understanding of the wider benefits of the concept (Murdoch & Whitehead, 2010). Mrs. Davies's quotation suggested that another "new term" emphasized the reality of initiative overload in education, and further exemplified a potential barrier in operationalizing physical literacy in primary schools (Jerome & Bhargava, 2015). By the end of the project, however, all three teachers made reference to the holistic and individualized nature of physical literacy:

It's important that we develop the whole child: the physical, the mental, the emotional and the social parts in PE, so they would carry on enjoying sport and physical activity after they leave us, and hopefully inspire them to be active for the rest of their life. (Mr. Rogers, postintervention interview)

It's not just about educating them; not just their literacy, not just their numeracy; it's their awareness of keeping fit in order to make sure that they leave us and go on to secondary school as a whole child. (Mrs. Davies, postintervention interview)

Mrs. Davies's response alluded to the monist philosophy, whereby pupils' minds and bodies are interrelated, hence, exemplifying a deeper understanding of the concept in comparison to the needs assessment phase (Edwards et al., 2017; Whitehead, 2010; Whitehead & Almond, 2013). This growth in the three teachers' understanding of physical literacy was initially developed in the workshop and built upon throughout the physical literacy intervention. The collaborative weekly discussions with the PI centered on the complex and nonlinear nature of physical literacy in line with the key principles of effective professional development.

Growth in PE-specific knowledge. The second subtheme was an increase in the teachers' awareness of, and application of, PE-specific knowledge. In line with the key principles of effective professional development, the PI shared PE resource material (content) and importantly, collaboratively discussed the suitability of the resources (pedagogy) for the pupils (Atencio et al., 2012). However, despite the number of PE resources (manuals, books, and DVDs etc.) located in the staffroom, the three teachers did not refer to these resources at all during the needs assessment phase. Consequently, drills aimed at developing physical competence tended to be static in PE lessons throughout Phase 1. For example in hockey, the "teacher could identify the areas of weaknesses in performance but was unable to convert/transfer passing into an applied setting. Drills were static and done in isolation. More active drills are required in order for pupils to successfully transfer into a game situation" (PI reflection). This observation highlighted Mrs. Davies' limited application of knowledge in a games context, specifically, the knowledge and application of modified games and game-centered approaches (e.g., Teaching Games for Understanding; Bunker & Thorpe, 1982). In turn, the applied nature of this approach would allow learners to progress from simple to complex movement capacities (Whitehead, 2010).

With reference to the physical competence element of physical literacy (Whitehead, 2010), it was observed that all teachers predominantly developed locomotor skills, partly developed manipulative skills, but, however, lacked developing body management skills during the needs assessment phase. As such, pupils were provided with very few opportunities to develop the body management skills deemed to be the foundation of other movement patterns (Whitehead, 2010). In the needs assessment phase, teachers did not plan PE lessons, which may explain why body management skills were omitted. Indeed, there were disparities between planning and organization for classroom and PE lessons. That is, all classroom lessons were carefully planned and included learning objectives, starter tasks, main activities, and plenaries in a progressive and differentiated manner; this was not the case with the planning of the PE lessons. Indeed, Mrs. Davies and Mrs. Jones did not plan any PE lessons during the 3-month needs assessment phase, and though Mr. Rogers planned some PE lessons during the needs assessment phase, his planning for PE was not carried out in the same rigorous manner as were his classroom lessons.

These needs were identified and implemented into the 6-month physical literacy intervention. During the intervention, all movement vocabularies were planned into PE lessons, including locomotor, body management, and manipulative skills (National Curriculum for Physical Education, 2008). This was achieved from the embedded collaborative weekly discussions between the teachers and the PI when discussing competitive (rugby) and creative (gymnastics) activities with Mrs. Davies:

... a variety of travelling movements to develop the locomotor capability such as side-step, cross over, fast feet, jumping over

obstacles and body management skills to drop to the ground and get back up. (reflection)

... body management skills like dish, arch, front support, back support, balance on one hand and one foot, different jumps and locomotor skills, such as bunny hops, foxes, frog hopping and camel walking. (reflection)

The weekly collaborative discussions between the PI and Mrs. Davies in the urban school were crucial in developing content knowledge through applied movement vocabularies in different environments. Furthermore, in the rural school, planning PE lessons collaboratively as a trio (PI, Mr. Rogers, and Mrs. Jones) led to an increase in the teachers' PE-specific knowledge. Though Mr. Rogers loosely planned his PE lessons during the needs assessment phase, the weekly collaborative discussions between the PI and the two teachers provided opportunities to learn from each other (Hunzicker, 2011). Understanding teachers' individual dispositions toward PE and different physical activities, allowed the PI to further develop the activities the teachers felt most comfortable delivering, which were games and competitive activities (National Curriculum for Physical Education, 2008).

Recognizing the importance of PE. The third subtheme identified a positive shift in teachers' attitudes toward prioritizing PE in the curriculum. Observations from the needs assessment phase identified many disruptions to PE lessons. Events outside the control of the class teachers, such as sports competitions, trips, and special assemblies took place that hindered PE lessons from proceeding as usual. The intermittent PE lessons in the rural school continued from the start of November until the Christmas break "because pupils were on a trip to their secondary school" (PI, observation notes) and "because of practising for the Christmas concert" (PI, observation notes). Though this finding was a clear cause for concern, it was consistent with evidence from previous literature stating that PE lessons are canceled more frequently than any other subject on the primary school curriculum (Hardman, 2010). Though disruptions were less prominent in the urban school, preparations for the Christmas fair, singing rehearsals for the Christmas concert, and general Christmas classroom tasks interfered with all lessons, but especially PE. For some pupils in these two schools, PE was the only structured physical activity they received all week (Bailey, 2000). As such, canceling PE lessons, combined with rainy December South Wales weather (which meant indoor playtimes) denoted high levels of physical inactivity and likely disruptions to pupils' physical literacy development (Whitehead, 2010).

During the 6-month physical literacy intervention, it was evident from observations that all teachers prioritized PE. Cancellations of PE lessons occurred less frequently, and teachers acknowledged in postintervention interviews that they believed physical literacy was equally important to a child's development as literacy and numeracy. These views were transferred to Year 6 pupils during Mrs. Davies' athletics lesson by saying: "Being healthy and active is just as important as being able to know your times tables" (observation note). During the weekly collaborative discussions, the PI continually emphasized the importance of physical activity as a means of developing the whole child, which was likely to have caused this shift in attitude.

Indeed, the collaborative discussions developed an awareness of teachers' responsibility in ensuring positive outcomes to pupils' health in later life from quality PE provision was prominent: "That we [teachers] instill enthusiasm in children and they [pupils] realise

the importance of staying healthy and doing physical activity at a young age so when they become adults, there will be less problems with their health” (Mrs. Davies, postintervention interview). This suggested that Mrs. Davies recognized the importance of developing pupils’ affective, cognitive, and social domains as well as their physical competence in order to influence their lifelong physical literacy development (Edwards et al., 2017; Keegan et al., 2019). This change was achieved by following the key principles of effective professional development and fostering a supportive environment tailored to the schools’ health and well-being strategies (Hunzicker, 2011; O’Sullivan, 2002).

Operationalizing Physical Literacy

Four subthemes evolved from the theme, *Operationalizing Physical Literacy*. The first subtheme, *transferring classroom practice into PE*, derived from 18 of the lesson observation notes, 11 of the collaborative reflection sessions, and three of the teacher interviews. Five examples have been selected to describe this subtheme. The second subtheme, *differentiating learning*, originated from 16 of the lesson observation notes, 22 of the collaborative reflection sessions, and three of the teacher interviews. Nine examples have been selected to describe this subtheme. The third subtheme, *ipsative assessment*, stemmed from 13 of the lesson observation notes, 11 of the collaborative reflection sessions, and three of the teacher interviews. Six examples have been selected to describe this subtheme. Finally, the fourth subtheme, *confidence in operationalizing physical literacy*, was observed in four of the lesson observation notes, two of the collaborative reflection sessions, and three of the teacher interviews. Two examples have been selected to describe this subtheme.

Transferring classroom practice into PE. Pedagogical and operational differences between the classroom and PE were observed during the needs assessment phase. Indeed, there were disparities between the planning procedures for classroom and PE lessons. Every classroom lesson was carefully planned on set templates that included learning objectives, starter tasks, main activities and plenaries in a progressive and differentiated manner, whereas PE was not. In effect, Mrs. Davies and Mrs. Jones did not plan any PE lessons during the needs assessment phase, and though Mr. Rogers planned some PE lessons, his planning for PE was not carried out in the same rigorous manner as were his classroom lessons.

The lack of planning in PE lessons omitted crucial pedagogical elements. For example, there was a clear absence of learning objectives in PE lessons (Mrs. Davies and Mr. Rogers, observation notes). Such absence of learning objectives is considered problematic given that pupils were unlikely to fully understand the purpose of the PE lesson, what was expected of them, and what they should know/do by the end of the PE lesson (Paine, 2014). In contrast, classroom-based subjects had clear learning objectives, whereby pupils clearly understood the teachers’ expectations (Capel, Leask, & Younie, 2016). Pupils would therefore benefit if this effective pedagogical stratagem from the classroom was transferred into the PE context.

To operationalize physical literacy and offering high-quality PE provision, good practice from the classroom was transferred into PE during the physical literacy intervention, as illustrated by the following reflection: “I made the comparison to the classroom, whereby the lesson always has a learning outcome and how imperative it was to share with pupils the aim of the lesson in

PE and in the classroom” (PI, reflection). Indeed, this transfer of pedagogy was achieved through purposeful questions during the embedded collaborative discussions. This process encouraged teachers to reflect continually on the learning process and was embedded alongside their duties and responsibilities, aligning with the key principle of effective professional development (Hunzicker, 2011).

Differentiated learning. To ensure the professional development program was instructional focused to align with the key principles of effective professional development, the PI ensured that pedagogical practices, such as differentiating (Hunzicker, 2011), were frequently discussed. During the 3-month needs assessment phase, in both schools “tasks were not differentiated for pupils’ individual abilities” (PI, observation notes). Given that tasks should be varied and differentiated to maximize opportunities for self-referenced targets, the three teachers’ lack of differentiation was problematic in nurturing pupils’ motivation (Vickerman, Walsh, & Money, 2015). It was observed that the higher physical ability learners became disengaged in PE due to boredom, and the lower ability learners became disengaged due to a lack of competence in completing the task, as illustrated in a PI observation note: “Pupils were engaged during the partner activity but when groups completed the task with cones, some pupils disengaged and started to misbehave; particularly the higher ability pupils.” This level of disengagement from the higher ability learners suggested the need for a change in teachers’ pedagogical practice while delivering PE to ensure tasks were challenging, yet realistic for each individual, and thereby aligning with the individualized element of the physical literacy journey (Vickerman et al., 2015; Whitehead, 2010). With a high variance in abilities, and a high number of pupils with additional learning needs, particularly in the rural school, differentiating tasks for individual needs in PE was challenging for the teachers. That said, linking to the previous theme, all three teachers differentiated tasks in classroom lessons, for example, by providing “extra work sheets to the higher ability group for mathematics task” (PI, observation notes). Nonetheless, understanding the variance in abilities during the needs assessment phase offered the PI an insight into the daily challenges that teachers faced while trying to create positive, high-quality learning environments for their classes (Merrell & Tymms, 2012).

Given that the concept of physical literacy is individualized, differentiating tasks to meet individual needs was crucial in operationalizing the complex and nonlinear nature of physical literacy. As such, differentiation was a core pedagogical topic during the weekly collaborative discussions:

The pedagogical focus of today’s discussion centred on differentiation again in cricket, so different challenges were placed, different balls and rackets would also be offered . . . for example in the quick cricket game there were different distances which equated to a point system (PI, reflection).

The differentiated tasks during the physical literacy intervention phase created a more inclusive environment, for example, pupils chose “their own level of ability on each station and create their own routine” during gymnastics, and “pupils chose the type of racket, ball and distance of the run” during cricket lessons (PI observation notes). At the start of the intervention phase Mrs. Davies believed differentiating in PE with Year 6 pupils was challenging:

When the children are younger it’s easier because they’re all about the same in terms of physical development, but by the

time they reach year six, you've got children playing cricket and rugby for the county, and others that, maybe except for PE lessons, they don't do anything physical outside of school (preintervention interview).

Indeed, as pupils enter the upper end of primary school, their ability to compare their own physical performance against peers becomes more sensitized and frequent (Welk & Eklund, 2005). Offering pupils "different options to choose their own level" (PI, observation notes) created an inclusive environment placing emphasis on ipsative assessment.

Ipsative assessment. Where possible, judgments on performance should be made against a pupil's previous attainment; it should be noncomparative, self-referenced, and ipsative assessment (Spengler & Cohen, 2015). It was observed that all teachers frequently compared pupils' performances in PE by "the best performer" (PI, observation notes) which would likely be detrimental to pupils' attitudes toward PE and physical activity (Bannon, 2013). In the needs assessment phase, all teachers employed assessment for learning strategies and praised pupils on effort and personal success during classroom lessons when circulating around the classroom and approaching the group tables (Whitehead & Almond, 2013). Though pupils were aware of the higher and lower ability groups, performance comparison between pupils was not observed in the classroom. Research indicates that comparing pupils' academic performance would have negatively affected pupils' motivation, confidence, and self-esteem (Green, 2002). That said, it should be recognized that it is more difficult, logistically, to provide individualized feedback in PE lessons because pupils are physically more spread out.

With these disparities between classroom and PE pedagogy, focusing on ipsative assessment was crucial in operationalizing physical literacy throughout the intervention. The focus on ipsative assessment resulted in Mrs. Davies "praising pupils individually a lot more on their efforts" (PI, observation notes), and "encouraging pupils to try their best" during PE lessons (PI, observation notes). By the end of the project, all teachers demonstrated growth in recognizing the importance of applying ipsative assessment strategies in PE. For example, Mrs. Davies stated, "it's not about winning or who's the best, it's about improving on what they have done in the past" (postintervention interview). Indeed, as the intervention progressed, Mrs. Davies and Mrs. Jones ceased to create a comparative environment and incorporated the principles of ipsative assessment into their PE lessons. One athletics lesson prominently evidenced this change in practice: "Teacher promoted ipsative assessment by timing the number of laps pupils can achieve in 5 min and focusing on individual progress" (PI, observation notes). Despite the gains in implementing ipsative assessment in PE lessons with all three teachers, Mrs. Jones expressed the need for "summative" assessments in PE to evidence progress:

For assessing in PE, we've tried to think about where pupils are individually and how much they've improved. We also now do more peer-evaluation methods which work very well in PE. Although these assessments are child-centred, I don't think an inspector would see it as real evidence of assessment from us as teachers. (postintervention interview)

Although Mrs. Jones appreciated the significance of assessing pupils against their personal best to improve their motivation and confidence in PE, in reality, the pressures of evidencing progress to align with governmental policies is pertinent. In

turn, advocates should voice the inconsistencies between child-centered educational practices and governmental policies to policymakers. This important finding was uncovered because an emphasis in the present PDPL was placed on sustaining an ongoing relationship with teachers as opposed to one-off training (Atencio et al., 2012; Hunzicker, 2011).

Confidence in operationalizing physical literacy. Overall, the collaborative weekly discussions from the physical literacy intervention increased teachers' confidence in teaching PE and thus operationalizing physical literacy. Mrs. Davies's initial confidence levels to teach PE were low during the needs assessment phase: "... I don't feel as confident to teach PE compared to other subjects" (preintervention interview). However, postintervention statements depicted a contrasting outlook: "I am in my element teaching PE, and I know maybe the odd teacher, if they could get rid of one lesson, it would be PE, but not me. That is one lesson that will always stay" (postintervention interview). This confirms a clear growth in confidence. This focus on teachers' growth is rooted in the key principles of effective professional development whereby the PI nurtured the teachers as learners (Armour et al., 2015). Acknowledgment that growth in learning is complex and individualized, and, hence, can be exhibited in different ways was essential in the present study.

Discussion

A key feature of the present study was the observable impacts on teachers' knowledge and operationalization of physical literacy after implementing the nine key principles of effective professional development. Flexibility was pertinent while conducting school-based research, as teachers have different levels of experiences and confidence while teaching PE, and as such, a "one-size-fits-all model" does not suffice (Hunzicker, 2011). An important finding from the present study was the crucial role of including the 3-month needs assessment phase to help facilitate the design of a successful 6-month physical literacy intervention for both schools (O'Sullivan, 2002). During the needs assessment phase, the PI was able to acquire a greater understanding of the teachers' strengths and needs to develop their PE practice.

A finding that was consistent in both schools was that teachers did not naturally transfer well-recognized pedagogical and assessment practices from the classroom into the PE context. As a consequence, a crucial contributor to the perceived success of the present PDPL approach was the PI's observations of both classroom and PE practices in order to make fair judgments about the teachers' pedagogical capabilities and allow the transfer of positive classroom pedagogy to the PE setting. Some previous PE-CPD programs have focused solely on observing teachers' PE pedagogy and have omitted classroom pedagogy (Duncombe & Armour, 2003). Adopting this latter approach, however, would have limited the opportunities to develop teachers' overall professional practice.

Based on the differences in the three teachers' responses during the postintervention interviews compared with the preintervention, the content of the physical literacy workshops was experienced as effective in increasing teachers' understanding of the physical literacy definition. That said, the hour-long workshop was an introduction to the concept and did not permit time to explain how teachers can operationalize the key messages of physical literacy into practice. The impact of "one-shot," workshop-based, PE-CPD programs have previously been criticized

because teachers are less likely to apply the content once they “return to their daily routine” (Hunzicker, 2011, p. 177). Sustainable changes to teachers’ practices were achieved through embedding the principles of the physical literacy concept and high-quality PE. The embedded and dialogic nature of the professional development intervention did not overload the teachers with modifications to their practice, and therefore created sustainable changes (Holdsworth, Wyborn, Bekessy, & Thomas, 2008).

Limitations

That only two schools and only three teachers participated in the present study might have limited the study’s potential impact. Nevertheless, having only two schools and three teachers did allow for an in-depth professional development that developed a sustainable change in teachers’ practice.

Conclusion

To the authors’ knowledge, this study is the first to offer a program focused on enhancing primary school teachers’ knowledge and operationalization of physical literacy. The principles adopted in the present study work in a complex primary school-based environment, hence, can be applied in future professional development programs. The present study exemplified the current pressing need to support primary school teachers to operationalize physical literacy through the delivery of high-quality PE lessons. Although the present professional development program was delivered to Year 6 (fifth grade) primary school teachers, its adaptability has been replicated in different contexts. For example, the nine key principles of effective professional development have already been utilized recently in a Sport Wales funded “Physical Literacy Programme for Schools” action research project, where the program was adapted to working with Year 3 teachers (7- to 8-year olds; Morgan, Bryant, Edwards, & Mitchell-Williams, 2019). Future research should consider following the nine key principles for effective professional development in other environments.

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Appendix 1: Teacher Interview Guide Pre-intervention

1. Background of the teacher

- Could you explain your pathway to becoming a teacher, for example, where did you go to university?
- What about the physical side—how was your experience at school in PE lessons?
- Do you / did you do any physical activity/sport?

2. School—PE lessons

- Describe the structure of PE lessons at school. (probe: the school in general/ more specifically your lessons)
- What are your strengths while teaching PE?
- Are there any aspects you would like to improve while teaching PE?
- What aspects of learning do you enjoy most about PE?
- What qualities do you think are important when planning PE lessons?
- Describe what you would normally do this term in PE.

- Monitoring and tracking are very important in terms of assessing pupils' attainment levels. Do you monitor in PE? If yes, what monitoring techniques do you use?

- Does the school hold sports clubs lunchtime / after school? If so, what kind of clubs?

- Do you contribute to/run extracurricular clubs? If so, which club(s)?

3. Physical literacy

- What do you think when hearing the term “physical literacy”?

- What is your definition of physical literacy?

- Why do you think that it's important for children and young people?

- What is your role as a teacher in promoting physical literacy? Specific examples?

- As a primary school teacher, in your opinion how does physical literacy play a role within the curriculum?

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