

A Qualitative Exploration of Physical Literacy and Teaching Efficacy of Pre-service Physical Education Teachers

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The research on physical literacy has been deeply rooted in groups of children and adolescents. Investigation of the significant others of students such as teachers, coaches, and parents is warranted. A series of continuing professional development promoting physical literacy had been delivered in Hong Kong and Taiwan; however, this concept was ignored in physical education (PE) teacher education, which is also an environment to develop PE teaching efficacy. The purpose of this qualitative study was to further explore the relationship between physical literacy and PE teaching efficacy specific to the context of PE teacher education. Data were collected through eight individual and two focus group interviews, and analyzed by

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grounded theory techniques and procedures using ATLAS.ti software. The themes of physical literacy, PE teaching efficacy, and courses in PE teacher education were found. The participants' experience of physical activities was reinforced during the teacher training. Additionally, the authentic teaching experiences of supervised teaching practice and professional courses of the PE curriculum design and class management could positively affect their PE teaching efficacy. A framework for advocating physical literacy in the future teacher preparation program is needed.

Keywords: physical literacy; teaching efficacy; teacher education; qualitative study

Introduction

Starting from the 21st century, the concept of physical literacy has been popularized from the United Kingdom to worldwide in the physical education (PE), sports, and public health contexts (Cairney et al., 2019, United Nations Educational, Scientific and Cultural Organization, 2015). However, the concept of physical literacy and its definitions are still debatable across academia (Bailey, 2020; Quennerstedt et al., 2021; Shearer et al., 2018). Most previous qualitative papers (83%) specified Whitehead's definition (Edwards, Bryant, Keegan, Morgan, Cooper, et al., 2018): "as appropriate to each individual, physical literacy can be described as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engagement in physical activities for life" (Whitehead, 2019, p. 11). Clarification on operationalizing the philosophical concept as well as discovering evidence and interventions has been published in two special issues in the *Journal of Teaching in Physical Education* (Dudley et al., 2019; Durden-Myers & Whitehead, 2018). Additionally, recent physical literacy researchers predominantly focused on the assessment and development of children and adolescents (Edwards, Bryant, Keegan, Morgan, Cooper, et al., 2018), while investigations relating to the pre-service PE teachers (PSPETs) and PE professionals, who could promote physical literacy and further spread the concept to their fellow students, were overlooked.

Attributes of Physical Literacy

In Whitehead's (2010) discussion, motivation, confidence and physical competence, and interaction with the environment are the core attributes that form the reciprocal relationships of physical literacy. Three additional attributes — sense of self and

self-confidence, self-expression and communication with others, and knowledge and understanding — are developed from the interaction of the first three attributes. Then, the latter three will reinforce the reciprocal attributes again, and so forth. “Sense of self and self-confidence” is the embodiment of the rewarding experiences in physical activities. “Self-expression and communication with others” is the interpersonal interaction of feeling and responding to others through verbal and non-verbal communication. “Knowledge and understanding” is the description and evaluation of movement experiences and physical activity lifestyle on how to improve movement and health (Whitehead, 2010). With the development and reinforcement of each attribute of physical literacy, the person will become physically literate by participating in physical activities throughout life while understanding its importance for lifelong health (Choi, Sum, Leung, et al., 2018). Although these attributes have been updated in the book *Physical Literacy Across the World* (Whitehead, 2019), the additional attributes were considered in the affective, social, and cognitive domain of physical literacy in the context of physical educators (Choi, Sum, Wallhead, et al., 2021; Sum, Ha, et al., 2016, Sum, Cheng, et al., 2018).

Physical Literacy and PE Teacher Education

The investigation of the physical literacy beliefs and occupational socialization of PSPETs can be examined in three phases: anticipatory phase, professional phase, and organizational phase (Flemons et al., 2018), and this study focuses on the first two phases. The physical literacy journey that started at the individuals’ birth is the anticipatory phase. Participating in a variety of physical activities, and the positive relationship with significant others, such as previous teachers, could be one of the reasons for individuals choosing PE teacher education (Conlin, 2013). In the professional phase, PE teacher education is one of the substantial parts to develop and sustain the physical literacy of PSPETs. They learn to plan the PE curriculum, instruct fundamental movement, and nurture motivation throughout this period. Afterward, they can apply what they have learned by teaching work in the school context and receive corresponding feedback from supervisors to improve their teaching ability. The observation of their supervised teaching practice through lived experience is one of the important parts of teacher training (Flemons et al., 2018). Teacher educators could suggest some game-based pedagogical methods and curricula for them (Lundvall, 2015) such as Teaching Games for Understanding (Thorpe et al., 1986) and Sport Education (Siedentop et al., 2019). These methods offer a wide variety of interactive activities; nonetheless, it is challenging for PSPETs to instruct and observe students’

movements in this dynamic environment (Flemons et al., 2018). Regarding the philosophical underpinnings of monism, existentialism, and phenomenology, teacher educators should encourage PSPETs to recall their past physical literacy journey (i.e., prior physical activity experience such as PE lessons and sports participation) and develop their teaching philosophy of using the concept of physical literacy.

Physical Literacy and PE Teaching Efficacy

Grounded in constructivists' social cognitive theory, the teaching ability and efficacy of pre-service teachers in general teacher education can be developed through various academic activities. PE teaching efficacy is a subject-specific and multi-dimensional concept to measure self-efficacy and efficacy belief relating to pedagogical skills and core competencies (Humphries et al., 2012). Given that the self-efficacy of pre-service teachers was high, an effective teaching preparation program and teaching efficacy are positively related (Tschannen-Moran et al., 1998). However, teaching efficacy eventually decreases during the first year of teaching as a result of large workloads and inadequate teacher education (Friedman, 2000; Gavish & Friedman, 2010; Hoy & Spero, 2005). Consistent with the general context, PE teacher education could have a positive effect on the PE teaching efficacy of PSPETs by introducing and experiencing content knowledge, pedagogical content knowledge, and scientific knowledge of teaching (Erbaş et al., 2014; Wooten-Burnett, 2016; Zach et al., 2012). Such PE teaching efficacy should be well-developed to avoid regression in the organizational phase when they face obstacles early in the careers of PSPETs.

As an attempt to implant the concept of physical literacy into PE teacher education, a previous cross-sectional study used hierarchical linear regression to discover the predictive effect of perceived physical literacy on PE teaching efficacy among PSPETs (Choi, Sum, Wallhead, et al., 2021). Specifically, if PSPETs have either a low perception of physical literacy or teaching efficacy, they may experience difficulties during supervised teaching practice in adapting student-centered pedagogies and contents. However, measurement of simple and linear methods in quantitative and cross-sectional designs might not be sufficient in interpreting the holistic meaning of the physical literacy concept. A qualitative research design was then suggested to align with the method of assessing and charting physical literacy by using interviews, observations, and video recordings (Green et al., 2018). Therefore, more research is necessary to examine the positive relationship between physical literacy and PE teaching efficacy in the context of PE teacher education.

The Current Study

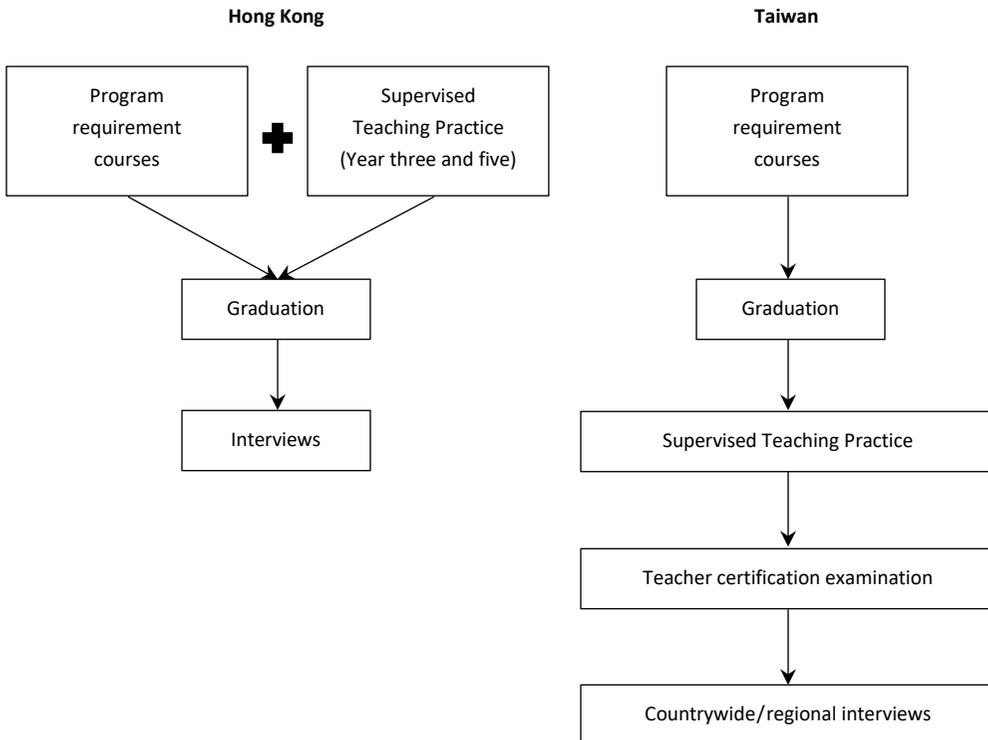
Physical literacy is still a controversial notion in the PE context. The measurement and assessment methods of this concept have been debated among idealist and pragmatic scholars (Edwards, Bryant, Keegan, Morgan, Cooper, et al., 2018). Simultaneously, teachers dismissed this concept as “old wine in new bottles” (Robinson et al., 2018, p. 296). As such, the deliberation of physical literacy and related constructs in the context of PE teacher education is necessitated (Choi, Sum, Wallhead, et al., 2021). It could also echo similar research on scientific literacy and self-efficacy in the science education context (Demirel & Caymaz, 2015). Guided by physical literacy (Whitehead, 2010, 2019) and PE teaching efficacy (Humphries et al., 2012), this study aimed to further explore the relationship between physical literacy and PE teaching efficacy in the context of Hong Kong and Taiwan PE teacher education.

Although both regions have emphasized the aim of physical literacy in the school PE curriculum since 2015, the teacher education system in both regions differs in program duration and course emphasis (Table 1), and also the graduation requirement of supervised teaching practice and accreditation examination (Figure 1). The five-year teacher training programs in Hong Kong focus more on theoretical courses with the requirement of supervised teaching practice at both primary and secondary levels. Accordingly, a PSPET of Hong Kong is certified as a teacher once they complete all graduation requirements. While in Taiwan, PSPETs concentrate more on practical courses during the four years of training. The teachers in Taiwan are accredited when they finish the post-graduate supervised teaching practice and teacher certification examination. The potential common and different factors between both regions should be taken into consideration when conducting this qualitative exploration study.

Using the phenomenological methods from a constructivist stance, this study employed a qualitative design with the following research questions: (a) “What attributes of physical literacy and PE teaching efficacy are related?” and (b) “How does the PE teacher education system affect PSPETs’ physical literacy and PE teaching efficacy?” By defining the philosophy and outcome measures properly, those qualitative data could correspond to the holistic features of physical literacy. This study was therefore restricted to PSPETs. They could share their ideas, values, and experiences with any practical skills courses, PE and educational theory courses, and supervised teaching practice during the period of obtaining knowledge in professional development.

Table 1: The Graduation Requirement Credit Proportion of Hong Kong and Taiwan Teacher Education Institutes

	Hong Kong		Taiwan
	University 1	University 2	University 3
Educational studies	14%	19%	21%
Practical skills courses	10%	10%	39%
PE-related theoretical courses	40%	19%	20%
supervised teaching practice and internship	7%	12%	0%
General education	14%	12%	0%
Language requirement	10%	5%	0%
IT competence	1%	0%	0%
Free elective	4%	23%	20%
Total	100%	100%	100%
Normative study period (years)	5	5	4
Graduation requirement credits	147	156	128

Figure 1: The Process From PSPETs to In-service PE Teachers in Hong Kong and Taiwan

Method

This study sought to determine the nature of the relationship between physical literacy and PE teaching efficacy specific to PE teacher education by using constructivists' grounded theory techniques and procedures (Corbin & Strauss, 2007). Face-to-face semi-structured individual interviews (Wragg, 2002) and focus group interviews (Krueger & Casey, 2000) were used to understand how the experience of teacher training affected the participants' perceptions of physical literacy and PE teaching efficacy. The results could establish the significance of the relationship between physical literacy and PE teacher education and reveal how the previous physical activity experiences of PSPETs established their efficacy in teaching PE. The ethical approval for this research study was obtained through the lead author's institution.

Participants

Purposive sampling (Patton, 2014) was adopted to identify suitable participants for this study. Homogenous sample selection was used by considering the demographic information of PSPETs, including region, gender, year of study, supervised teaching practice experience, specialized sport and teaching intention, in an attempt to obtain a representative sample of interviewees for in-depth information. Eight participants aged 20.5 (± 1.32) years from a variety of backgrounds (Table 2) agreed to participate from three universities in Hong Kong and Taiwan. Their genders, regions, and experiences of supervised teaching practice were in equal proportion. Five of them specialized in team sports while the remaining three were in individual sports. Three-fourths of the participants declared their intention to be PE teachers.

Table 2: Summary of Participants' Characteristics in the Qualitative Interviews

Pseudonym	Region	Gender	Year of Study	Experience of supervised teaching practice	Specialized Sport	Teaching Intention
Sam (HK1)	Hong Kong	M	2	No	Wushu	Yes
Teresa (HK2)	Hong Kong	F	2	No	Touch Rugby	Yes
Kate (HK3)	Hong Kong	F	4	Yes	Handball	Yes
Frankie (HK4)	Hong Kong	M	5	Yes	Volleyball	No
Calvin (TW1)	Taiwan	M	2	No	Basketball	Yes
Lily (TW2)	Taiwan	F	3	No	Track and Field	No
Oliver (TW3)	Taiwan	M	5	Yes	Soccer	Yes
Yolanda (TW4)	Taiwan	F	5	Yes	Fencing	Yes

Note: Taiwan PSPETs who were studying the fifth year refer to those who were graduated and experienced supervised teaching practice.

Interviewing

Eight semi-structured individual interviews and two focus group interviews comprised of four participants each were conducted by the lead author in Hong Kong and Taiwan. The questions for individual interviews primarily explored participants' background and personal experience in PE teacher education guided by the existing literature on physical literacy and PE teaching efficacy. For the focus group interviews, the researcher did the member check by summarizing the individual interviews. Accordingly, the questions were drafted after individual interviews and concentrated on comparing their experiences and perspectives (Barbour & Kitzinger, 1999). All interviews were conducted in person and audio-taped. Each interview took approximately 60 minutes to complete. Recorded materials were then transcribed and translated from Chinese into English by the researcher. To ensure consistency and accuracy of data processing and interpretation, the researcher was responsible for data collection, transcription, translation, and analysis.

Data Analysis

Grounded theory techniques and procedures were used (Corbin & Strauss, 2007). In the process of open coding, the transcriptions were coded line-by-line to generate categories and subcategories. This stage created appropriate codes and uncovered new concepts. The generated codes were the open codes and categorized into attributes of (a) physical literacy and PE teaching efficacy, and (b) the courses of PE teacher education program. Fewer ideas were described, and fewer new codes were developed in each new interview. Then, the process of axial coding was used to identify the relationships between categories and their sub-categories. Corbin and Strauss (2007) have used the term coding paradigm to describe the organization of emerging connections. The idea is to relate a category (i.e., the phenomenon-interaction; causal or relational conditions; and context) to its subcategories (i.e., intervening conditions; action/interaction strategies; and outcomes and consequences). ATLAS.ti (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) is a software that analyzes multiple qualitative data simultaneously such as transcripts, images, audio and video (Paulus & Lester, 2016). The software was used in this study to code the data and analyze the content.

Trustworthiness

In conducting a qualitative study, the researchers strictly followed the criteria of trustworthiness including credibility, transferability, dependability, and confirmability (Shenton, 2004) to ensure the reliability of the result by interpreting participants' perspectives with avoidance of personal bias. To ensure credibility, the interview transcripts had gone through the process of member checks and were sent back to the participants for asking them to correct errors or inaccuracies by email. For transferability, although this group of participants was formed by a small number of PSPETs in Hong Kong and Taiwan, other teacher education institutes were invited to enrich the conceptualization of the emerging results. For dependability, all the interviews were tape-recorded and transcribed. Memos and notes were written during the process of data collection and analysis to help the formation of codes and groups. The data collection and analysis processes were discontinued when there was no supplemental information from additional interviewees. Through systematic record-keeping and ongoing evaluation of findings, confirmability of the research findings was established.

Results

In a previous cross-sectional study, Choi, Sum, Wallhead, et al. (2021) reported a positive predictive relationship between perceived physical literacy and PE teaching efficacy of PSPETs by a hierarchical linear regression model. This study supplemented the predictive relationship using semi-structured individual and focus groups interviews. Two main themes shown in Figure 2 were found to describe the experiences of PSPETs during the period of teacher education: (a) relationship between physical literacy and PE teaching efficacy in the context of PE teacher education; and (b) PE teacher education program — the courses and related situations that the PSPETs engaged in teacher training that would affect their physical literacy and PE teaching efficacy, such as supervised teaching practice, PE curriculum design, and classroom management.

Physical Literacy and PE Teaching Efficacy

The core capabilities of physical literacy include motivation, confidence, and physical competence. These capabilities develop three additional attributes: sense of self and self-confidence, self-expression and communication with others, and knowledge and

Figure 2: Main Themes of the Relationship Between Physical Literacy and PE Teaching Efficacy in the Context of PE Teacher Education

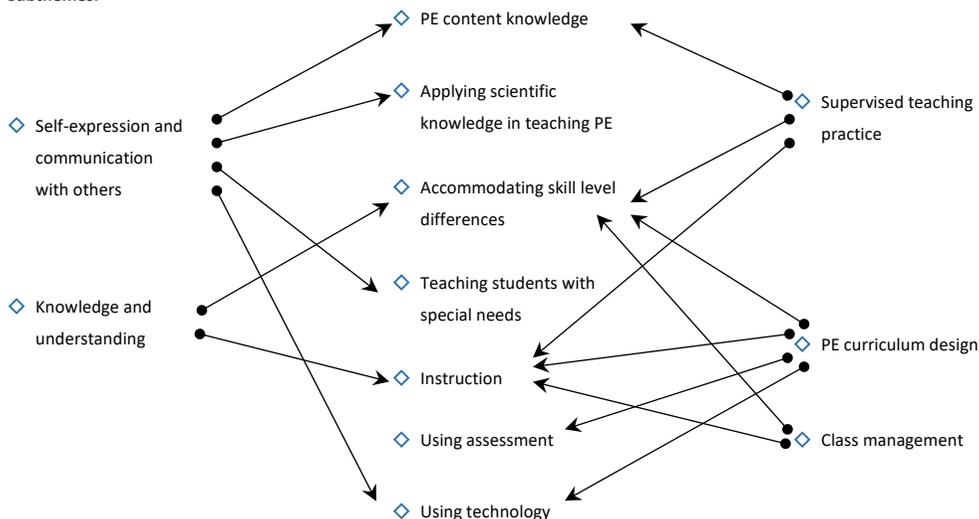
Main themes:

◇ Physical literacy

◇ PE teaching efficacy

◇ PE teacher education

Subthemes:



understanding (Whitehead, 2010). Previous systematic reviews advised further examining the relationship between physical literacy and its pertinent correlates (Edwards, Bryant, Keegan, Morgan, & Jones, 2017). Taking PE teaching efficacy into account could provide insight into how PSPETs' physical literacy journeys influence their teaching behaviors (Choi, Sum, Wallhead, et al., 2021). Specifically, the professional phase of occupational socialization is a favorable circumstance to reflect on previous experiences of participating in physical activity and reveal future involvement in instructing PE. The present study discovered how the participants perceived teacher education as a process of augmenting the physical literacy journey and developing teaching efficacy. Codes of the physical literacy attributes of self-expression and communication with others, together with knowledge and understanding were found and their relationships with the attributes of PE teaching efficacy were also discussed.

Self-expression and communication with others

The attribute of self-expression and communication with others is a means to display an individual's holistic nature through verbal and non-verbal modes. If we dive into the context

of PE teacher education, a physically literate PSPET can perceive others' (i.e., supervisors, students, parents) feelings and awareness, and respond to them appropriately (Whitehead, 2010). In a previous study, physical literacy was a predicting variable for PE teaching efficacy in developing content knowledge, applying scientific knowledge in teaching, teaching students with special needs, and using technology (Choi, Sum, Wallhead, et al., 2021).

1. PE content knowledge

The content knowledge is not only obtained from teacher education but also from the previous physical activity experience of PSPETs in the PE lessons during childhood and adolescence. During teacher education, the verbal communication of performing the activities and non-verbal demonstration of movement by PSPETs could positively affect their efficacy on content knowledge. PSPETs could cultivate their affective, cognitive, and psychomotor domains of physical literacy during supervised teaching practice in school settings. The lesson content is important for students in developing physical movement (Strong et al., 2005). Frankie (HK4) learned from his negative experience during supervised teaching practice and developed his teaching efficacy which echoed the above argument:

Dividing key points and demonstrations into small steps are the teaching technique to let students comprehend the skills. If you are not able to explain each micro-skill to them, they might not understand what you are saying. I thought students would understand what I mean after my demonstration, but in fact, they didn't understand. This was what I suffered during my supervised teaching practice in secondary school.

Kate (HK3) added her interaction with colleagues to discuss the subject content:

During my supervised teaching practice, I need not only to interact with students but also to communicate with supervisors and coaches to exchange ideas and experiences of teaching sports even though I have already obtained that knowledge.

PE content knowledge includes several types of teams: individual, leisure, and outdoor sports as well as physical fitness. Considering the verbal and non-verbal communication skills during the provision of physical literacy-oriented games, PSPETs must be proficient in explaining the activities to students and discussing them with colleagues and coaches. With sufficient knowledge of each activity, they can present the key points through their communication skills (Silverman & Mercier, 2015).

2. Applying scientific knowledge in teaching PE

Although teacher educators provided some practical sessions in their sports science courses, authentic involvement in teaching and applying related knowledge are more important for PSPETs (Humphries et al., 2012). By communicating with students, PSPETs could decide whether to introduce some scientific knowledge during the lessons, as Frankie (HK4) mentioned:

After a few weeks of teaching practice, I realize that knowledge of sports science may not bring many influences on PE teaching. Those we have learned are quite difficult at school levels. We could know their ability after communicating with students and then decide whether we apply scientific knowledge in PE lessons or not.

Oliver (TW3) tried to use easier knowledge to encourage students to engage in physical activities:

There are activities with vigorous, moderate or low intensity in a lesson. After each activity, I ask them to measure their heart rate and compare the levels of intensity. Students cannot judge the intensity by perceiving their feeling, but measuring heart rate is a scientific way to know it. With my communication skills, it is easier for me to explain why they should engage more in the activities if their intensity were low.

Communication is the capability of transferring knowledge to students. With the efficacy of applying scientific knowledge in teaching, PSPETs can perceive if students understand the concepts by their reactions. To provide quality PE, PSPETs should design interactive lessons from a holistic perspective focusing on the physical activity levels with the consideration of scientific knowledge.

3. Teaching students with special needs

Some students are diagnosed with special educational needs in the context of inclusive education. In the PE lessons during supervised teaching practice, PSPETs must take into consideration the abilities of those students with special needs to plan the lessons. Sam (HK1) shared his practice:

We need to observe and understand their behavior and performance during PE lessons and see whether students act more excitedly while we are having activities.

Calvin (TW1) shared his mindset and suggested some ways to get along well with students with special needs and their parents:

I think being patient and encouraging is important to teach students with special needs. Sometimes they need encouragement when they fail at their first attempt. We also need to communicate with their parents on how to help the students to have lessons in a normal class.

Kate (HK3) recognized that she should put more effort into students with special needs:

If I cannot express myself well, my students cannot understand what I have said; therefore, we need to have good expression skills to teach students with special needs in PE class. When ordinary students are doing their practice or training, we should use the extra time to take care of students with special needs.

PSPETs believed that self-expression and communication with others can affect the efficacy of teaching students with special needs in regular PE classes. PSPETs should develop effective communication with their students with special needs and their significant others (Roetert & MacDonald, 2015). PSPETs could recognize the characteristics of students with special needs from their participation in activities and conversations with them and their parents. These would help to overcome students' difficulties and develop motivation and confidence during the lessons.

4. Using technology

The attributes of self-expression and communication with others generated some impact on the efficacy of using technology in planning, teaching, and professional communication. PSPETs should embed innovative items into the lessons to develop effective communication with students in the lessons. Thus, students can be motivated and confident in engaging in the activities. Frankie (HK4) reaffirmed the importance of this relationship, especially the need to explain the reasoning behind using technology to his colleagues:

For using technology in PE teaching, your school principal and colleagues would ask you about its advantages and benefits of it. The way of your presentation and persuasion on how those technologies support the teaching depends on your expression and

communication skills. You cannot insist on your arguments without any supporting data and information.

Calvin (TW1) added the advantages of using technology:

If we use technology, they can watch the videos and observe the demonstration and, in the meanwhile, we can tell students some key points of the skills.

The participants agreed that self-expression and communication with others are affected by their efficacy in using technology. PSPETs can deliver the key points during and at the end of lessons easier with the effective use of technology. Providing videos to students is one of the non-verbal communication methods that would enhance students' interests and encourage them to keep searching for further knowledge on the Internet. In connecting PE and technology, further investigation is needed to determine if students can develop healthy lifestyles through enriching experiences such as esports, exergames, active video games, and so on (Ennis, 2015; Lazerte & Lathrop, 2006; Sheehan & Katz, 2011; Sun, 2015).

Knowledge and understanding

Whitehead (2010) suggested a physically literate individual should acquire the principles of movement and performance, as well as understanding the value of exercise, health and fitness under the attribute of knowledge and understanding. In the context of PE teacher education, PSPETs can gain proficiency in diagnosing movement and evaluating performance during teacher training. Notably, the attribute of knowledge and understanding could be a variable to affect teaching efficacy in accommodating skill level differences during instruction (Choi, Sum, Wallhead, et al., 2021). PSPETs are also responsible for promoting healthy lifestyles to students.

1. Accommodating skill level differences

PSPETs believed that their physical literacy knowledge and understanding would positively affect their efficacy in recognizing skill level differences of students. Previous physical activity experience and awareness of PSPETs form a reference for observing the levels of students. This may further help in developing the fundamental movement skills of students appropriately by planning different tasks. Sum (2016) recommended that PE professionals should attain some specific coaching qualifications to broaden their

knowledge. Participants suggested the same thought that physical educators should update their proficiency to offer different levels of activities for students. Kate (HK3) expressed her idea which is consistent with the scholars' comments:

We should keep updating our skills and knowledge and give progression to our students. For those students with higher ability, you should provide some advanced skills while for those of lower ability, you need to lower the skills level to accommodate them.

Oliver (TW3) echoes:

Even if two students are having the same problem, we cannot put them together and teach them with the same method. We should acquire broad knowledge before teaching students; this is a prerequisite to being a teacher or PSPET. This could help us to encounter the problem of skill level differences.

In this sense, the accumulation of knowledge across PSPETs' physical literacy journey is important to further develop into professional knowledge during teacher education, and hence, the efficacy of accommodating skill level differences. After PSPETs acquired knowledge in the professional courses, supervised teaching practice is the last stage where they can practice designing various activities.

2. Instruction

Instruction includes management, motivation, and communication in the class. PSPETs recognized that knowledge and understanding would affect their efficacy of instruction in the class. It would enhance their teaching quality and students' learning by explaining an activity briefly and appropriately (Silverman & Mercier, 2015). Yolanda (TW4) stated how important the capability of knowledge and understanding of the guidance of activities during PE lessons is:

When we design a lesson plan, we based it on the knowledge acquired before. During supervised teaching practice, we teach students by giving them clear instructions according to the lesson plan. If the instruction is unclear, the students may be confused which would slow down their learning process. If our knowledge were broad enough, we could accurately give guidance to students.

Teresa (HK2), who was a national representative athlete concurrently, made the following statement to inspire PSPETs to develop their knowledge comprehensively:

Most PSPETs participate in a specific sport. They have a high level of knowledge and understanding only toward their sports, but not the others. When they teach some sports that they are not familiar with, they may provide advanced drills to a new learner and may not know the exact rules and techniques due to the lack of understanding, which can also affect their feedback to students.

The participants agreed that PSPETs who specialized in specific sports are not physically literate; it is because they may not be holistically developed through a wide variety of physical activities. Their knowledge about other sports is lacking (Mandigo et al., 2009; Penney & Chandler, 2000; Whitehead, 2007). The instruction may be weakened as they are not familiar with the rules and techniques. They may encounter struggles in teaching and solving students' questions.

PE Teacher Education Program

The participants believed that some courses in the PE teacher education program can reinforce their previous experiences participating in PE and physical activities, and positively affect their PE teaching efficacy. The courses offered by the teacher education institutes provided opportunities to interact with other pre-service teachers from different disciplines. By learning some traditional and contemporary theories and methods to design curricula and manage classes, they can apply the learning in the school context to gain authentic experiences during supervised teaching practice. They indicated that supervised teaching practice is the most important course throughout the training, followed by PE curriculum design and classroom management.

Supervised teaching practice

Authentic teaching experience can be gained during supervised teaching practice by applying learned teaching methods and interacting with students and supervisors. Observation, feedback, and integration of theory with practice could help PSPETs to develop teaching ability effectively and overcome difficulties in students' learning. Supervised teaching practice can reinforce PE content knowledge. The experience provides them chances to rethink how to teach students more efficiently. As Sam (HK1) stated:

We should understand more about every sport and especially fundamental movements for the sake of students' potential ability toward sports.

Teresa (HK2) acknowledged the assistance from the supervisor:

The supervisor provides you with some practical knowledge of teaching for the enhancement of PE content knowledge.

Compared with the micro-teaching in practical courses during teacher education, the authentic situations provide PSPETs more opportunities to observe and identify students' abilities as well as to give them feedback and further amend activities based on their level differences (Mulholland & Wallace, 2001; Tschannen-Moran & Hoy, 2001; Wooten-Burnett, 2016). Teresa (HK2) elaborated:

There must be students with different skills level in every school; the supervisor teaches us how to observe and deal with these situations based on their own experiences.

Safety precautions are important in PSPETs' instruction. They understand what their classmates will do during the micro-teaching in the courses of PE teacher education program; in the authentic situation, they have to make sure that their instructions were easily understood by the students in the school context (Erbaş et al., 2014). Sam (HK1) recalled the experience:

We need to provide clear instructions to prevent students from making unnecessary mistakes, especially in primary schools. Supervised teaching practice can also force me to keep key points brief and clear, which is also a good instruction for me to express my requirements for those drills.

Oliver (TW3) used an alternative method to give instructions:

I would ask some students to make their own decision or judgment during the activities; in the meanwhile, I observe and give suggestions according to students' performance.

The participants recognized that supervised teaching practice could build up their efficacy of PE content knowledge and how to accommodate skills level differences and provide instructions, based on the practical comments from supervisors and their own experience of learning through practice.

PE curriculum design

The course of curriculum design introduces some traditional and innovative theories and concepts and equips PSPETs with the knowledge to plan and implement PE curriculum for students at the school level. This affects their efficacy toward the ability to bring about learning for students and overcome outside difficulties that impede students learning in PE lessons. They recognized that PE curriculum design is foundational in developing the attributes of accommodating skill level differences, instruction, and using technology. Lily (TW2) explained how the course of PE curriculum could affect the efficacy of accommodating skill level differences:

We can progressively design the classes, i.e., to increase the difficulties gradually. All students participate in the same activities to check their ability of that skills, so we can provide the next drills for higher- and lower-ability students.

Lily (TW2) also believed that the efficacy of instruction could be positively changed:

Some innovative curricula provided knowledge of designing activities to develop students' team spirit and interaction and hence, a positive attitude toward sports and PE.

For the efficacy of using technology, Oliver (TW3) recalled the information from instructors:

The instructors shared some websites about designing curriculums and lessons which we can use as a reference.

Designing a physical literacy-oriented curriculum and assessments should be consistent with philosophical assumptions (Almond & Whitehead, 2012). Teacher educators should indicate the importance of promoting the concept of physical literacy including cultivating interest, engagement, and reflection. By applying the PE curriculum design during supervised teaching practice, they can practice how to plan and complete the teaching plan with the assessment to check the students' learning progress.

Classroom management

By applying theory to practical sessions such as management skills, student-teacher relationships, and coordination between discipline and guidance, the course of classroom

management can inform PSPETs on how to design an optimum learning environment for students. PSPETs recognized the course could enhance the efficacy of accommodating skill levels difference and instruction. Oliver (TW3) learned how to accommodate skill level differences in the PE lesson:

The classroom management course provided us with theories and methods to deal with a class whose students vary from very active to very inactive. These two groups of students are the most difficult to manage. As every student obtained particular characteristics and qualities, we have to use different methods to enhance the effectiveness of learning and teaching progress.

Lily (TW2) illustrated that this course could intensify the efficacy of instruction:

It did not teach us how to speak, but we learned how to deal with different scenarios and solve difficulties while communicating with students.

Yolanda (TW4) raised an example during her supervised teaching practice:

Although we learned from this course of classroom management, we need to apply it in authentic situations during supervised teaching practice. I prepared my teaching plan well, but I found myself spending too much time on class management. Students may mess around when I was preparing equipment.

The course of classroom management affects participants' PE teaching efficacy positively as they can develop more ideas on teaching students through in-class discussion. Flemons et al. (2018) have proposed that teacher educators should expedite the "understanding and establishing the connections between classroom pedagogy and the concept of physical literacy" (p. 301). Good classroom management with the integration of teaching approaches is important for them to develop PE teaching efficacy (Almond & Whitehead, 2012).

Discussion and Conclusion

Prior studies (Conlin, 2013; Flemons, 2013; Flemons et al., 2018; Moreno, 2013; Newton & Bassett, 2013; Taplin, 2013) discussed the European perspective on promoting the concept of physical literacy to future practitioners, but only one of them had examined

the relationship of how physical literacy affects their efficacy toward teaching in PE (Choi, Sum, Wallhead, et al., 2021). This qualitative study used grounded theory techniques and procedures to analyze the interpretations from PSPETs regarding their experience in teacher education to build a more concrete and supportive framework of physical literacy and PE teaching efficacy. This study can then contribute to promoting physical literacy in the context of Asian PE teacher education.

This study indicated the importance of the linkage between physical literacy, PE teaching efficacy, and professional development courses in PE teacher education programs. High-quality teacher education is an essential element for future practitioners to deliver a quality PE program in the school context (United Nations Educational, Scientific and Cultural Organization, 2015). PSPETs developed their beliefs and attitudes from particular lived experiences of traditional PE and physical activities before engaging in the professional development of PE teacher education. The sport-based multi-activity traditional curriculum affects PSPETs' belief in physical literacy. During the professional phase, teacher educators should provide opportunities for PSPETs to reflect on their improvement or regression throughout the individualized physical literacy journey (Flemons et al., 2018). Teaching efficacy can also be developed through the process of teacher education. Particularly, the participants suggested courses such as supervised teaching practice, PE curriculum design, and classroom management as most helpful.

Consistent with previous studies investigating physical literacy in PE teachers in Canada (Robinson et al., 2018), the participants in this study also used vocabulary during the interviews in describing their experience of regimented lesson content such as abilities, drills, skills, and techniques. Teacher educators should introduce some physical literacy terminologies and pedagogical methods to PSPETs to further discover how to implement the concept into the school PE curriculum (Lundvall, 2015; Silverman & Mercier, 2015). Considering the relationship between physical literacy and PE teaching efficacy, this study may support such argument that physically literate PSPETs with high PE teaching efficacy are more likely to develop students as physically literate individuals when they engage in school PE after graduation (Choi, Sum, Wallhead, et al., 2021; Flemons et al., 2018).

The necessity of defining physical literacy in a study is warranted. The previous study used the terminology of perceived physical literacy by using a self-report instrument (Sum, Ha, et al., 2016) to indicate the relationship with PE teaching efficacy. The terms "perceived physical literacy" and "physical literacy" are conceptually different and should not be used interchangeably, just like "self-efficacy" and "efficacy" as well as "perceived physical

competence” and “physical competence.” Perceived physical literacy can be viewed as the value of the sense of self and self-confidence, self-expression and communication with others, and knowledge and understanding when individuals engage in physical activities (Choi, Sum, Leung, et al., 2018; Sum, Cheng, et al., 2018). The term “physical literacy” was used in the current study to supplement the formulated relationship in the sense that the actual experiences of the participants were discussed in the interviews.

This study cannot avoid any limitations and guarantee ratification. The use of a qualitative study required face-to-face interviews such that anonymity was not possible. Only eight full-time undergraduate students majoring in PE were invited to this study and they may have similar age, academic and socio-economic backgrounds. In addition, this research was unable to measure the physical domain of participants which is one of the physical literacy domains. To improve the transferability and applicability of this study, further research is suggested to develop a framework to promote physical literacy in PE teacher education in Chinese societies. The framework should consider the philosophical underpinning of physical literacy and school PE curriculum standards. As mentioned by previous literature and the participants, it is more effective to promote physical literacy to students if the teachers share the same beliefs. If teachers are physically literate and have developed as highly efficacious in teaching PE, their students may be impressed by the teachers and be motivated to participate in physical activities (Flemons et al., 2018).

Future studies are also recommended to investigate the physical literacy and teaching efficacy of PE teachers with a larger sample size during their transition from the final year of undergraduate studies to the first year of teaching. Finally, the investigators can intervene in the supervised teaching practice by asking PSPETs to use different PE pedagogical models such as Sport Education (Siedentop et al., 2019) and Teaching Games for Understanding (Thorpe et al., 1986) in promoting students’ physical literacy. By providing a dynamic and challenging environment to the students through a model-based approach, an eight-week intervention comparing physical literacy-oriented and traditional PE lessons could be designed and implemented.

To conclude, this qualitative study supplemented the PSPETs’ framework of physical literacy and PE teaching efficacy. PE teacher education is an important period for a PSPET to reinforce the physical activity experience in developing self-confidence since their birth. Self-expression and communication with others, and knowledge and understanding are the attributes to establish teaching efficacy through a series of teacher education programs. Although the outcomes do not suggest an interacting framework among physical literacy,

teaching efficacy, and teacher education currently, in the long term, policymakers, teacher education institutes, and school management personnel can consider the implementation of the concept of physical literacy in the PE teacher education and primary and secondary school curriculum. A teacher preparation program to advocate physical literacy could be invented to further flourish such a concept for the next generation.

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以質性研究探索準體育教師的身體素養和教學效能

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摘要

身體素養的研究已經深深植根於兒童和青少年群組，其重要他人（例如教師、教練和家長）亦需要進行相關調查。香港和台灣已進行一系列促進身體素養的體育教師持續專業發展，但這一概念在建立教學效能的體育教師教育環境中仍被忽視。本質性研究的目的是進一步探討體育教師教育環境下的身體素養與教學效能之間的關係。通過八個個人訪談和兩個焦點小組訪談收集數據，並運用 ATLAS.ti 軟件進行紮根理論技術和程序的分析，結果找到身體素養、教學效能和體育教師教育課程的主題。在準教師培訓期間，參與者的體力活動體驗得到了鞏固。此外，教學實習的真實經驗和體育課程設計及課堂管理的專業課程會對準體育老師的教學效能產生積極影響，而未來的教師教育亦需要一個倡導身體素養的框架。

關鍵詞：身體素養；教學效能；教師教育；質性研究

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