Abstract

Purpose: This research explored a model of Lesson Study owned entirely by pre-service teachers (PSTs), conveying its potential to facilitate mutual spaces of learning between peers beyond formal hierarchical relationships with expert teachers. Fuller's (1969) conceptual framework of teacher development informed the study, consisting of self, task and impact 'phases of concern'.

Methodology: Participants were Secondary Physical Education PSTs (n=17), completing a university-led Postgraduate Certificate in Education course (PGCE). Action research methodology was adopted during school placements, when PSTs engaged in Lesson Study with peers. Data obtained through a group discussion board, individual questionnaires and interviews, was subjected to inductive analysis, with key patterns compared to locate themes.

Findings: All PSTs felt Lesson Study contributed positively to their training, reinforcing perceived benefits of cycles of action for planning, observing a lesson, reviewing and adapting the plan before re-teaching the revised plan. Findings reveal increased confidence in reducing self and task concerns through four emergent themes: acquiring content and pedagogical knowledge; developing the planning process; understanding individual learners' needs; and embedding reflective practice. Mutually supportive peer-learning environments created pedagogic space beyond formal mentoring processes, augmenting learning to teach and the understanding of learners' needs.

Implications for practice: Endorsement of Lesson Study by PSTs as a method of engaging in a positive peer-learning climate suggests the workability of this model.

Originality: Findings contribute to existing literature exploring the effectiveness and impact of Lesson Study within initial teacher education.

Key words: Lesson Study, Peer-Learning, Initial Teacher Education, Physical Education, Pedagogic Space.

Paper Type: Research Paper

Introduction
The manner in which Lesson Study is perceived and conducted varies around the world, although a common format is demonstrated through a cyclical process of planning, teaching a research lesson, reflection and revision. In essence, the critical lens of Lesson Study hones in on learners and the most effective way for teachers to teach a topic or activity. Professional development benefits for teachers are widely acknowledged, including: developing subject knowledge, understanding of pedagogy, developing observation skills and one's ability to understand learning. In parallel to this, 'adaptions of 'formal' lesson study have been credited with having a positive impact on pre-service teacher education' (Gurl, 2011, p 523). The reported benefits of Lesson Study for pre-service teachers (PSTs) mirror those for teachers (Leavy, 2010; Parks, 2008; Simms & Walsh, 2009). With the above in mind, this paper intends to contribute to the growing body of research exploring the potential of Lesson Study to bridge the initial teacher education (ITE) theory-practice interface (Cheng, 2014). Informed by the view that PSTs benefit greatly from peer-learning (Byra, 1996; Sherin & van Es, 2005), what follows is an exploration of a peer-learning model of lesson study, owned and managed by dyads of PSTs during their school-based training. Whilst the insights of PSTs learning to teach Physical Education expands the existing portfolio of lesson study literature, most notably in subjects such as Maths (Burroughs & Luebeck, 2010; Fernandez, 2010; Gurl, 2011; Lewis et al., 2009; Lewis et al., 2013; Parks, 2008; Puchner & Taylor, 2006), Science (Lewis & Tsuchida, 1997; Lim et. al., 2011; Marble, 2006; Marble, 2007; Ono & Ferreira, 2010) and primary/early childhood programmes (Chassels & Melville, 2009; Simms & Walsh, 2009).

Published Lesson Study studies within ITE focus on benefits and challenges (Chassels & Melville, 2009), instructional design and strategy (Cheng, 2014), professional growth (Burroughs & Luebeck, 2010; Cajkler et. al, 2013; Marble, 2006) and principles of teaching (Simms & Walsh, 2009). Reported benefits of lesson study for PSTs include the impact on professional growth, facilitated through the establishment of professional learning communities (Chassels & Melville, 2009). Further highlighted benefits by previous studies include engaging in professional conversations with experienced teachers about the 'big ideas' relating to their subject pedagogy and the overarching curriculum (Gurl, 2011), exploring pedagogy in more depth (Cajkler et al, 2013) and supporting improvements in teaching through the proactive learning of mistakes (Marble, 2006). Importantly, Lesson Study allows PSTs to meaningfully engage with inquiry into teaching (Chassels & Melville, 2009; Marble, 2006) and by engaging in action research, learn through the evaluation of cycles of planning, delivery, reflection and refinement (Cheng, 2014). In contrast, reported challenges include: insufficient authentic time to collaborate (Chassels & Melville, 2009) and the logistics of immersing fully in all phases of the lesson study (Burroughs & Luebeck, 2010). Simple administrative features such as aligning timetables for research lessons (Chassels & Melville, 2009) also act as barriers to the process. Further, PSTs lack the experience to address common mis-conceptions or predict pupil responses, (Burroughs & Luebeck, 2010), with teaching strategies of trial and error often being a feature, which impacts on the lesson study (Cajkler et al, 2013); as does a potential lack of understanding of the lesson study process (Fernandez et al, 2003). Despite such challenges, Lesson Study offers an alternative approach to common patterns of school-based experience whereby PSTs observe expert practitioners, imitate what they have seen before receiving critical feedback

from the class teacher; a model Elliott refers to as an apprenticeship model of learning to teach (Elliott, 2012). This apprenticeship model arguably, validates the process of professional (Lawson, 1983) and organisational acculturation (Van Maanen & Schein, 1979), and thus magnifies a significant challenge for PSTs, at a time when they are beginning to explore their own pedagogical practices. Whilst situated within a specific department for their teaching placement, they are immersed within the school's culture (Zeichner & Tabachnik, 1981), which, may or may not be compatible with their evolving identity of pedagogical practice. Additionally, such a model pre-supposes the formal hierarchical relationship between PST and mentor (Le Cornu, 2005). Embedded within this apprenticeship model, Korthagen et al., (2006), identify three fundamental principles for enhanced learning about teaching, including reflection of practice, collaboration with peers, and coping with the competing demands of learning content whilst also learning about teaching. Different models of reflection have been integrated within ITE since the 1970s (Behets & Vergauwen, 2006; Collier, 1999; Tsangaridou, 2005) with the core purpose of facilitating reflective practitioners (Calderhead, 1992; Lamb et al., 2013). Notwithstanding, a wealth of literature identifies difficulties in fostering PSTs' critical reflection (Gore, 1990; Rovegno, 1992), not least because they often have limited time to reflect on their teaching (Lee & Wu, 2006). Within university-led ITE programmes two different arenas provide opportunities for developing reflective abilities (Eraut, 1995): during the university (or training institution) training phase and during the school-based training phase (i.e. teaching practicum). It is the school-based training phase that provides opportunities for PSTs to engage in critical reflection of their teaching and accordingly, the ideal forum for Lesson Study.

Existing Lesson Study literature feature PSTs' collaboration with practising teachers, (Booth, et al., 1990; Cajkler et. al, 2013; Chassels & Melville, 2009; Fernandez, 2002; Parks, 2008). It is not unusual to find these professionals also being responsible for PST training and assessment, emphasising hierarchical relationships between them. This may determine the type of interactions that occur (Gurl, 2011). This study was motivated by the desire to encourage PSTs to manage their own lesson study opportunities, creating a community of practice beyond the formal support mechanisms provided by expert teachers (Le Cornu, 2005). And, echoing Marble (2006), intended *to 'shift measures of success for lessons from the informed opinions and observations of experts'* (p.94).

Rationale and context of the study
The inspiration for the peer-driven process lay in grounding preparations for destinations as practitioners in the field, where self-reflection and observation are standard components of practice and tools for advancement within the teaching profession. The impetus was to extend provision already in place for developing professional competence in the classroom for PSTs, by placing specific emphasis on them navigating their own lesson study opportunities with a peer. The question posed was: to what extent could a model of lesson study owned and managed entirely by the PSTs convey potential in facilitating mutual spaces of pedagogical learning between peers? Additionally, the study set out to address some noted challenges reported on lesson study within ITE, such as engaging in full cycles of Lesson Study.

Lesson study opportunities were established within school-based phases of training. The peer-driven lesson study process created opportunities for PSTs to learn from each other beyond the course assessment structure and within a less formal learning environment, (Lamb et al, 2013). It was anticipated that they would support each other in developing their skills through 'focussed opportunities to experiment with aspects of practise and then learn from that experience' (Grossman & McDonald, 2008 p. 189-190). To aid the process, lessons were captured on video, and peer-reviewed beyond the 'live' moment, (Romano & Schwartz, 2005). Whilst at university, PSTs were introduced to observation skills and were given several opportunities to record peers' micro-teaching and engage in peer-review dialogue in preparation for the lesson study opportunities during placements.

Conceptual framework

A conceptual framework of teacher development posited by Fuller (1969) informed the study. Fuller suggests a 'phases of concern' model, highlighting significant concerns facing PSTs as they embark on their training, consisting off: *self-concerns* focussing on themselves, their teaching technique and classroom discipline; *task concerns,* focussing on delivery of content; and *impact concerns*, focussing on pupil learning. The evolving model (Fuller and Brown 1975) 'conceptualized the development of teachers' concerns as passing through phases which are sequential and accumulative' (Pigge & Marso, 1997, p.225). Early concerns are directed towards the self, whilst a focus on pupil learning does not emerge until towards the end of training. This developmental concept is echoed by others (Conway & Clark, 2003; Richardson and Placier, 2001), and has informed a broad and far-reaching range of educational studies (Conway & Clark, 2003). Interpretation of the phases of concern exemplifies how PSTs display a shift in focus from instrumental, factual issues such as behaviour management and general survival in the classroom (Van Manen, 1977), towards a greater concern for pupils' learning and a deeper level of reflection (Van Manen, 1977; Zeichner & Liston, 1987). This journey also characterises a move from a 'pedagogy of necessity' Tinning (1988), to much deeper engagement with critical inquiry and reflection, termed 'pedagogy of the possible' (Tinning, 1988' p. 83). Furlong and Maynard (1995) present a learning trajectory experienced by PSTs, from early idealism to 'moving on', supported by situated learning via mentors in school placements. Practical concerns include subject knowledge, evaluating planning, answering pupil questions, asserting discipline and meeting the expectations of those assessing them (Thompson, 1963). Herold and Waring (2011) note that physical education PSTs prioritise development of practical subject matter and content knowledge, with perceived deficits in content knowledge impacting on their confidence when teaching. It seems apt that for the purpose of this study Fuller's model provides a lens through which to explore the impact of peer-learning between PSTs when embracing lesson study.

Methodology

An action research model was adopted (McNiff & Whitehead, 2002), as the incorporation of action research into ITE programmes can facilitate PST reflective abilities in relation to their teaching (Cheng, 2014). Participants were Secondary (training age phase 11-18) Physical Education PSTs (n=17: males = 9, females = 8; aged 21 to 30), completing a 38 week Postgraduate, Master's level Certificate in

Education course (PGCE) in eastern England. Informed consent was sought adhering to the researcher's university ethics procedures. During two school placements PSTs autonomously arranged the lesson study process. For the first lesson study opportunity during Placement 'A' (weeks 11-15), PSTs completed a paired placement conducting a peer-review task as a pilot for the lesson study process during Placement 'B'. Each PST selected a lesson to teach which their peer observed and recorded on an IPad. Immediately afterwards, they watched the recorded lesson, and engaged in a joint evaluative conversation. A template of questions associated with professional teaching and pedagogical skills was made available to scaffold discussions (Santagata, 2009). During Placement 'B' (weeks 22-36) they were paired with a different peer in another school by convenience sampling, based on geographical location of schools. And, since some PSTs knew each other socially, all were assigned a peer they only knew professionally. Together, they selected an activity they were both teaching and identified who felt the most confident in the subject area (PST 'A') and who felt less confident (PST 'B'):

Step 1: Collaboratively planning the study lesson: PST 'A' chose a class to conduct the Lesson Study on, and sent their peer their draft plan for them to offer feedback.

Step 2: Seeing the study lesson in action: PST 'B' visited the school to record PST 'A' teaching the lesson, directing the observation towards the learners and their learning.

Step 3: Discussing the study lesson: Immediately after the lesson, they watched the recorded lesson together, engaging in reflective dialogue about the effectiveness of the lesson, delivery methods and learning outcomes and how to improve learning opportunities. During this discussion step 4 was addressed ………

Step 4: Revising the lesson: Together, they re-wrote the original lesson plan, implementing the revisions discussed. PST 'B' returned to their school and taught the revised lesson to their own class, with PST 'A' observing and recording it. Together they reviewed the revised lesson, evaluating the impact of the improvements. Both PSTs kept the revised model plan. At a later date during the placement, the lesson study process (Steps 1-4) was repeated with a reversal of roles and activity, this time with PST 'B' leading the process in their school. During the study, some logistical limitations became apparent. If it proved problematic for a PST to observe the revised lesson being taught by their peer, they received a written evaluation instead, incorporating feedback from both their peer and the normal class teacher.

Data collection involved a multi-method approach (MacPhail et al., 2003) of surveys, individual interviews and the use of the university's Virtual Learning Environment (VLE). In consideration of Fuller & Brown's (1975) sequential and accumulative stages of development, PSTs completed individual questionnaires electronically after each lesson study process, (see appendix 1), consisting of seven (Placement 'A') and eleven (Placement 'B') open-ended questions aimed at triggering reflective discussion about their lesson study experiences. Twelve completed questionnaires were returned on each occasion. They were also invited to post their reflections on the VLE discussion board, guided by seven prompts (see appendix 2). In total, 15 threads of discussion were posted. At the end of the course they were invited to take part in individual interviews and 12 PSTs volunteered to do so. The aim of the interviews, each lasting approximately 30 minutes, was to ascertain PSTs' retrospective reflections on their experiences of engaging in the lesson study

process. They were all asked the same open-ended questions (see appendix 3), with additional questions to clarify and explore responses further (Patton, 2000). A dicta-phone IPad application captured the data, and later, transcribed verbatim. The interviews also allowed for triangulation of data and helped to ensure rigour and trustworthiness of the interpretations of the data (Curtner-Smith, 2002) during the analytical phase.

Due to the number of participants involved in the study, data analysis took the approach of individual case followed by a cross-case analysis (Patton, 2002) and subjected to inductive analysis (Hastie & Glotova, 2012). Narratives were compared and contrasted across the data sources, recording and cross-referencing similarities and differences. Through constant comparison of the data, a coding method, informed by Tsangaridou's (2005) coding schema was adopted to describe the nature of the lesson study experiences, with key patterns coded manually (Gibbs, 2002) and compared in order to locate common categories for further analysis (Patton, 2002). The data revealed four main themes which, in essence, exploit the multidimensional nature of Lesson Study as a model for building competence and confidence in the classroom for beginning teachers. These were: (a) developing the planning process; (b) acquiring content and pedagogical knowledge; (c) understanding individual learners' needs; (d) and embedding reflective practice. Analysis of the patterns within emergent themes resonate with Fuller's (1969) conceptualisation of teacher development and contribute to understanding how such aspects shape the embodiment of PSTs' dispositions towards navigating successful lessons at different phases of their training. Analysis of the data revealed a pattern of self and task concerns across the cycles of lesson study. Analysis of the interview transcripts, consolidated the position of a gradual shift in concern towards individual learning needs. Central to the findings is the tenet that establishing lesson study dyads between PSTs facilitated the transition in emphasis between embodied dispositions of self, task and impact concerns.

Findings and discussion
The purpose of the study was to determine the effectiveness of Lesson Study, owned and managed by PSTs, in facilitating mutual spaces of pedagogical learning between peers. All participants spoke in wholly positive terms about engaging in Lesson Study with a peer: '*I found it interesting to watch my buddy teach as whilst videoing I was constantly reflecting on my own practice*' (Q2, 4: female PST)*. A range of successful outcomes were endorsed as attested in this comment:

> Seeing someone do it and then having the confidence to go away and take that lesson plan that you had developed together, to then apply, I think was really good, 'cause I would have had a go at teaching soft ball, but I would not been as confident as I was knowing that this was sort of tried and tested. (Interview 3: female PST)

The surveys revealed that 100 per cent of the PSTs felt Lesson Study contributed in a positive way to their professional and pedagogical knowledge development: '*I feel the lesson study task had an impact on our subsequent professional relationship when working in school*' (Q2, 12: male PST); and,

6

> This worked very well as football is Ian's (pseudonym) specialist sport, meaning he could offer good ideas and strong subject knowledge. We sat down after the lesson to watch the video and discussed changes that could be made to make the lesson more successful. These included making the warm up link to football and the lesson aim, increase the difficulty of the passing and dribbling activity by adding a defender and change the pitch size for the matches. We made these changes on the lesson plan, which I then taught to my year eight pupils and Ian recorded. From the recording it was evident that these changes lead to a more effective and successful lesson. (Q1, 1: female PST)

Various elements of the lesson study process were highlighted, the common message being the perceived benefits associated with the cycles of action - planning and observing an initial lesson, reviewing and adapting the original plan and delivering a revised plan: '*to see how changing the lesson slightly made such an impact on the learning and the lesson as a whole was so useful*' (Q2, 8: male PST). Importantly, the opportunity to reflect between each of the cycles was acknowledged as an essential benefit of the process:

> It was also really beneficial to reflect on the lesson that I taught in more detail and to think more critically about how I could improve the lesson I taught. It was good to then see the changes we made in action and to see if the changes we made to the lesson actually improved the lesson. (Q2, 10: male PST)

The PSTs appreciated the reciprocal advantages of engaging in the lesson study cycle as articulated by a female PST: '*my paired placement colleague now has a refined and successful lesson plan he can now use in his future teaching. He had the opportunity to observe this in practice and reflect on its success*' (Q1, 1: female PST). These findings provide further testimony to the mutual contribution to professional development and learning when working with a peer (Collier, 1999; Lamb et al., 2013).

Practically, the ability to capture lessons by recording them was viewed positively and appreciated as a vital source of information to stimulate reflection: '*I also learnt how much I play with my whistle and swing it around while I am talking to the pupils, which is really distracting*' (Q2, 2: Female PST). When watching the recordings together, the PSTs were able to identify and construct their own narratives towards particular pedagogic practices contributing towards a 'habit of thinking' (Lamb et al., 2013), and subsequent teaching practice; as these observations report:

> I learnt through watching a recording of myself, that although I am aware of what I'm saying verbally and the details of the practice I'm setting up, I am less aware of the impact of how I say things in terms of in terms of nonverbal communication, body language, smiling etc. I can now implement this into my teaching and plan how I will introduce activities in an enthusiastic, excited way. (Q2, 7: male PST)

Whilst highlighting surface level reflection, particularly in reviewing personal teaching styles and managing the learning climate, these comments provide supporting evidence on benefits for PSTs' individually watching and collaboratively

discussing their videos (Clarke, 2009; Miller & Zhou, 2007; Zhang et al., 2011). Such reflection, whilst honing self-concerns, scaffolds the exploration of improving their own and their peer's performance in front of a class:

> It was nice to have somebody else who's on like the same level as me, so like another trainee look at my teaching and giving me feedback on how I taught and how I like plan my lessons and stuff as well.
> (Interview 10: male PST)

Wenger (1998) presents the notion of the community of practice as consisting of the expert teacher and the novice PST, acknowledging the important role that a mentor plays in PSTs' professional development (Booth, et al., 1990). Extending this expectation, the findings illuminate the additional perceived benefits offered by a peer in addition to the expert practitioner,

> I found the experience very enlightening as it gave me a different perspective on how other people who are experiencing the same situation as me view my teaching style. This gave me new and different feedback than from experienced teachers who may not be able to understand my circumstance. (Q2, 10: male PST)

This resonates with Capel et al.'s (2011) notion of professional socialisation during initial teacher training. The comments reveal that in addition to learning from their mentors, PSTs are also able to develop connections between their own dispositions towards teaching and those of their peers; highlighting tangible products of engaging in the lesson study process. The following discussion explores the emergent themes, reflecting on Lesson Study as an effective mechanism to enhance the professional learning of PSTs.

Developing the planning process

> Since completing the lesson study task I have now started to produce more detailed lesson plans giving me a deeper understanding on what I'm teaching and how to organise the pupils. I now evaluate my lessons in more depth giving me a more complete lesson so that when I come to teach this again it will be an improved lesson (Q2, 6: male PST).

The PSTs highlighted the development in their understanding of the planning process. This was significant as appropriate planning allows for anticipatory reflection (Loughran, 1996), enabling individuals to visualise content, organisation, structure and teaching strategies etc. – a fundamental strategy for novice teachers and central to successful lessons (Frudden, 2001; Gower, 2010); and, importantly, for the PST's confidence, as reported here:

> Rewriting the lesson plan on both occasions. Not only did this fill me with confidence that I had a detailed and structured plan it has given me the assurance to deliver this lesson in a different school (Q2, 6: male PST)

The ability to see the plan being executed was deemed as an essential element of the lesson study cycle: *'to see how a lesson plan that we thought was really good could easily not work as well as we had hoped'* (Q2, 4: female PST). These comments reaffirm previous findings endorsing the importance of planning for PSTs as a medium for 'thinking through what to teach, how to teach it and how to evaluate it' (Ruys et al. 2012, p. 352). When asked if engaging in the lesson study process

had helped their partner in any way, a third of the group identified sharp developments in understanding the planning process, for example:' *I feel I was able to develop and progress Sophie's* [pseudonym] *evaluation and planning knowledge'* (Q2, 6: male PST. Whilst these comments emerged early in the course of training, the views indicated an appreciation of the necessity for thorough planning in order to feel adequately prepared to facilitate learning opportunities as this female PST pointed out during her interview

> It helped teach George (pseudonym) the importance of planning and preparation for a lesson. I think it also helped him to appreciate the differences between two classes and how important it is to incorporate the different needs of each class into your plans.

This was a positive outcome, as 'pre-service teachers often have trouble comprehending the need for the extensive planning required of them' (Hall and Smith, 2006 p. 426). Moreover, unlike experienced teachers, PSTs are less able to anticipate potential challenges children may have with particular aspects of learning, and during their planning do not have the experience to predict where a lesson may need changing (Graham, et al., 1993). Further, PSTs are less knowledgeable of children's psychomotor and cognitive abilities, tend to be less child focussed (Ibid), and with little prior experience, struggle to know which tasks and activities are appropriate to facilitate learning.

Despite the identified improvements in the planning process, direct reference to pupil learning was scarce after the first lesson study during placement 'A', in line with Fuller's model. Data identified the focus as being directed towards self and task concerns, for example*: 'I was focusing in my head on small, minor details, without looking closely at the overall student engagement and whether students are engaging in the activity'* (Q1,10: male PST). However, an appreciation of understanding individual learning needs was the significant aspect to emerge from the second questionnaire and individual interviews, as one female identified, *'it has improved my understanding and appreciation of the differences between two upper ability classes of the same age. It has helped demonstrate to me that even though you are teaching the same lesson the delivery needs to be different for every class'* (Q2, 2: female PST); presenting a growing awareness of differentiation requirements to facilitate pupil learning.

Understanding individual learning needs
> Since completing the lesson study task, I am able to differentiate activities for both high and low achieving pupils, but still allow for full participation which challenges pupils at an appropriate level. (Q2, 7: male PST).

Being able to respond to individual learning needs is a complex process for PSTs to accomplish in their early days in the classroom, with much energy directed towards the whole class rather than individuals. Responding to individual learning needs within physical education presents a challenge when trying to ensure that physical activity is inclusive for: the most/least able, for each gender, for all (dis)/abilities, for all somatotypes and levels of physical fitness. Differentiation within physical education not only requires matching learning outcomes with appropriate physical and cognitive tasks and teaching styles, but also appropriate space, equipment and

pupil grouping. To be able to differentiate appropriately requires PSTs to have the confidence and competence to adapt their plan and employ a variety of strategies to address diverse needs (Scott & Spencer, 2006). Having the confidence to deviate away from the plan is not straightforward, especially when teaching an area where practical subject knowledge is less developed (Herold & Waring, 2011, P. 68). PSTs reported that their understanding of pupils' individual learning needs were shaped the most when completing the second lesson study opportunity. It was at this stage in their learning journey they felt able to implement teaching strategies to meet learners' needs, as the following excerpts exemplify,

> I feel this has helped to develop differentiation within my lessons. I now ensure that I carefully consider the number of pupils within my lessons and how well each activity will work with these group numbers. Space is also an aspect I ensure I think about when planning lessons. This has ensured pupils do not find activities too challenging or too easy due to group size and space. (Q2, 1: female PST)

And

> I have tried to deepen the learning in each activity in every lesson. So rather than doing a task and completing it, how can I make that task more effective, what can I add to the end for example a review or a feedback session to make the pupil think about why they have done that activity and deepen the learning. (Q2, 9: male PST)

This account concurs with previous studies by Fernandez, (2010) and Chassels & Melville (2009), suggesting a growth in PSTs thinking of ways to meet the needs of their pupils and the overarching goal for learning. The findings further demonstrate the power of Lesson Study in accelerating concerns toward impact, whilst also magnifying the important position reflection holds within the overall process. The nature and design of the lesson study process provided a safe and equal space (Lamb et al., 2013) for PSTs to 'proactively modify curricula, teaching methods, resources, learning activities, and student products to address the diverse needs of individual students and small groups of students to maximize the learning opportunity for each student in a classroom' (Tomlinson et al., 2003, p. 121). In essence, the lesson study process implicitly supported the PST's development in learning how to differentiate according to Tomlinson et al.'s definition. Further, the positives highlighted are even more reassuring taken that the process of differentiation is neither simple of straightforward for expert teachers to discern. Schumm et al., (1995) note that teachers' attempts at differentiation are often limited and ineffective with reactive and improvised modifications occurring during lessons (Tomlinson, 1995). The lesson study process provides the ideal forum for PSTs to act proactively towards children's diverse learning needs when revising the lesson. Whilst not oversimplifying a very complex and conceptual process, the PSTs were able to support each other in deciding what was to be taught, how it was to be taught and how the full range of learners might grasp the object of learning.

Acquiring content and pedagogical knowledge

> This study task has increased my football subject knowledge and has given me new ideas (Q1, 1: female PST).

The collaboration between PSTs highlighted the mutual benefits of working together to scaffold each other's content and pedagogical knowledge, overcoming an area of major concern for them: 'The dominant factor that separates the instructional

decision-making of a novice from an experienced teacher is an increased knowledge base' (Hall and Smith, 2006, p.432). Therefore, any opportunities for PSTs to develop their knowledge base through collaboration and sharing expertise during their training should be endorsed. One of the benefits of Lesson Study is the opportunity for teachers to address gaps in their subject/content knowledge (Lewis, 2002). The findings reaffirm this and prove of significant value, as deep subject knowledge is a key challenge for PSTs (Loewenberg Ball et al., 2008); especially so for physical education PSTs (Herold & Waring, 2011), who may have a limited view on how to define subject knowledge (Gower & Capel, 2004). Whilst different terms may be used to describe the various facets of subject knowledge required for effective teaching, the ITE journey enables a shift in emphasis from content to an emphasis on the facilitation of pupil learning (Herold & Waring, 2011). Previous studies have identified that the majority of physical education PSTs feel confident teaching games, but lack knowledge and confidence to teach dance and gymnastics (Capel & Katene, 2000). PSTs in the present study were honest in their reflections when articulating gaps in knowledge, for example *'it really helped because it built my subject knowledge, because I had no idea about soft ball before I went, so I learned a lot of stuff about soft ball in terms of the rules, the tactics'* (Interview 3, female PST); and, *'This allowed me to develop my football subject knowledge, after watching him teach and ideas he expressed during the planning stages'* (Q1, 1: female PST). These findings are in contrast to the work of Gurl (2011)*,* who noted that PSTs may be less willing to admit gaps in their knowledge, which may create barriers to developing this hugely important area. Honesty reported here may be facilitated by PSTs working independently with a training peer within mutually supportive spaces (Lamb et al., 2013), having complete ownership of the Lesson Study. These spaces are construed as being safe and non-judgemental whilst creating a sense of solidarity. The informal processes developed between the peers helped shape their acquisition of pedagogic knowledge through the sharing of key practices, subject knowledge and delivery experiences. Thus, the observation and mutual dialogue between the peers in a safe, informal environment may contribute to them apprehending specific forms of pedagogic practice. Essentially, incorporating lesson study into placement training contributes to Herold and Waring's (2011) notion of a progressive developmental process which shifts in emphasis from a more content-focused predisposition, towards the learner.

Embedding reflective practice

> I think the lesson study task has helped my reflective skills of observing physical education teachers, as the task helped me to start understanding how my reflections of someone else's lesson can help the planning and development of my own teaching. (Q1, 2: female PST)

School-based training provides an important forum for PSTs to make an effective transition between theory and preparatory practice on the one hand and real-life classroom practice on the other, by developing their capacity to reflect (Lamb et al., 2013). Acknowledging uncertainties and complexities in practice and engaging in meaningful deliberation are necessary for generating insights and for interrogating one's practice in a way that leads to sustained change. Such processes can lead to what Schon called 'legitimate form[s] of professional knowing' (1983, p. 69). Related to Tinning's (1988) argument on the pedagogy of necessity, the findings confirm the need to support PSTs in advancing from a focus on the instrumentals of teaching to one where they are more responsive and analytical in evaluating their practice. The

11

lesson study facilitated a series of reflective stages, demonstrating awareness, responsiveness, learning and changed action that, in turn, deepened PSTs reflective awareness during subsequent stages, and paralleling Schon's (1983) reflection in action. Sharing reflective accounts of each lesson as they watched the recording allowed them to learn from each other, whilst considering alternate points of view (Fernandez, 2010), as highlighted: *'The task allowed me to develop my reflective skills whilst observing other practitioners teaching physical education by pausing and reflecting during various scenarios and going in to each scenario in detail'* (Q1, 5: female PST). There was evidence that the PSTs developed discussions that looked beyond the study lesson, to a much broader pedagogical understanding as the following excerpt reveals,

> Being able to reflect on each other's teaching and revisiting the lesson
> together helped to improve our understanding of the needs of a variety
> of classes, along with being able to teach similar content, through
> various activities. (Q2, 7: male PST).

This supports Herold and Waring's (2011, p. 74) assertion that 'many pre-service teachers demonstrated a shift in the perception of their own roles, marking a transition from a more content-focused predisposition towards a more learner-centred one,' endorsing Fuller's (1969) impact concern phase of teacher development.

Whilst not an emergent theme per se, the notion of 'alternative space' (Lamb et. al., 2013) held currency within the infrastructure of the lesson study process for PSTs, with 45% highlighting the value of experiencing an alternative school environment – "*Going and visiting another school gives you another experience of another PE department and their like policies and their way of teaching lessons"* (Interview 10: male PST). The experience extended PSTs exposure to, and awareness of variety in communities of practice (Sirna et al., 2008), for example:

> Visiting George in his placement school was a very valuable experience
> as it allowed me to gain an insight into a very different school to my
> current placement school. The environment of his school was
> completely different to mine, in the sense of facilities, equipment, size
> of the department, types of pupils and how his overall department
> worked. (Q1, 1: female PST)

Collaboration with colleagues via cross-school Lesson Study is endorsed by Dudley (2012), allowing for a re-contextualisation of new experiences with dispositions already acquired from within their own school culture. Responding to such complexities can also prove beneficial when undertaking job applications (Lamb et al. 2013).

Conclusion

This paper has presented findings from a peer-learning Lesson Study dyad situated within a university based initial teacher education programme in the UK, contributing to literature on the effectiveness of Lesson Study within initial teacher education. One strength of the study, despite its small scale, was that PSTs were able to experience complete cycles of the lesson study process - a reported challenge in initial teacher education (Cajkler et al., 2013). The testimonies of the PSTs confirmed the development of a community of collegiality in relation to professional learning though peer-learning. Herold and Waring (2011) identify the importance of

the role of 'immediate communities of practice', such as the school department within which the PST is assigned. This peer-learning model has highlighted the importance of a more immediate community of practice - that of the cohort of PSTs themselves. They developed confidence in learning from peers, especially acquiring subject knowledge, developing their planning, understanding learners' needs and embedding reflective practice, as they planned, taught, observed, evaluated and discussed lessons. Collaboration with a peer at the same stage of training was viewed as easing the pressure they felt. The mutually supportive learning environment created pedagogic space beyond the formal mentoring process, allowing for risk-taking with revised lesson approaches, creating their own understanding of the links between planning, teaching and learning' (Cajkler et al., 2013). McBer (2001), states that 'pupil progress results from the successful application of subject knowledge and subject teaching methods, using a combination of appropriate teaching skills and professional characteristics' (p. 8). The lesson study process empowered the PSTs to learn through their teaching so that by the end of their training they demonstrated less concern about their subject knowledge. Greater confidence was evident in awareness of differentiation, assessment for learning and understanding learners' needs; which were consolidated through meaningful and focussed reflection, all essential ingredients for pupil progress. Arguably, authentic learning about teaching involves deeper critical engagement and immersion with the practice of others than a one year initial teacher education programme offers. However, these findings reveal notable progress made by all PSTs, especially in reducing self and task concerns (Fuller, 1969) and preparing for their transition to becoming an autonomous teacher.

The novel design of this study, with its focus on PSTs' ownership and autonomy in creating their own structures for Lesson Study is fundamental in creating and enabling a range of spaces to engage in planning, teaching and reviewing a lesson, scaffolded by mutual trust and collegiality. Lesson Study is able to support PST's as they grapple with the concept that the boundaries between planning, teaching and reflecting are cyclical, rather than distinct and linear (Yinger, 1977). Lesson Study engages pre-service teachers in a positive peer-learning climate, augmenting learning to teach. Additionally, the findings illuminate a juxtaposition with Conway's (2001, p. 90) position on novice teachers' everyday experiences, which involve 'looking toward the future with knowledge of the past from the viewpoint of the present'. This study responds to the call for more research into Lesson Study to support pre-service teacher development (Cajkler et al, 2013) and may act as a stimulus for future research, perhaps through a focus of the themes presented here whilst adding a further mechanism of support beyond the usual hierarchical mentoring structures. The endorsement for Lesson Study by PSTs as a method of engaging in a positive peer-learning climate during school placements, suggests the workability of this model; and as such, is worthy of consideration by pre-service teacher educators.

References

Behets, D. and Vergauwen, L. (2006), Learning to teach in the field. In: Kirk D, Macdonald D and O'Sullivan M (eds) The *Handbook of Physical Education*. London: Sage, pp. 407-424.

Booth, M., Shawyer, G. and Brown, R. (1990), Partnerships and the training of student history teachers. In M. Booth, J. Furlong and M. Wilkin (eds) *Partnership in initial teacher training*, London: Cassell, pp 99-109.

Burroughs, E. A. and Luebeck, J. L. (2010), Pre-service teachers in mathematics Lesson Study. *The Montana Mathematics Enthusiast,* Vol. 7, No 2-3. pp. 391-400.

Byra, M. (1996), "Post-lesson conferencing strategies and pre-service teachers' reflective practices", *Journal of Teaching in Physical Education,* Vol.16 No. 1, pp. 48-65.

Cajkler, W., Wood, P., Norton, J. and Pedder, D. (2013), Lesson Study: towards a collaborative approach to learning in initial teacher education. *Cambridge Journal of Education*, Vol. 43, No. 4, pp. 537-554.

Calderhead, J. (1992), The role of reflection in learning to teach. In: Valli L (ed.) *Reflective Teacher Education: Cases and Critiques.* Albany: State University of New York Press, pp.139–146.

Capel, S. and Katene, W. (2000), Secondary PGCE physical education students' perceptions of their subject knowledge, *European Physical Education Review*, Vol. 6, No. 1, pp. 46-70.

Capel, S., Hayes, S., Katene, W. and Velija, P. (2011), The interaction of factors which influence secondary student physical education teachers' knowledge and development as teachers. *European Physical Education Review*, Vol. 17, No. 2, pp. 183-201.

Chassels, C., and Melville, W. (2009), Collaborative, reflective, and iterative Japanese Lesson Study in an initial teacher education program: benefits and challenges. *Canadian Journal of Education*, Vol. 32, No. 4, pp. 734–763.

Cheng, E. (2014), Learning study: nurturing the instructional design and teaching competency of pre-service teachers. *Asia-pacific Journal of Teacher Education*, Vol. 42, No. 1, pp. 51-66.

Clarke, L. (2009), Video reflections in initial teacher education. *British Journal of Educational Technology,* Vol. 40, No. 1, pp. 959–961.

Collier, S. (1999), Characteristics of reflective thought during the student teaching experience. *Journal of Teacher Education,* Vol. 50, No. 3, pp. 173–181.

Conway, P.F. (2001), Anticipatory reflection while learning to teach: from a temporally truncated to a temporally distributed model of reflection in teacher education. *Teaching and Teacher Education*, Vol. 17, No. 1, pp. 89–106.

Conway, P.F. and Clark, C.M. (2003), The journey inward and outward: a re-examination of Fuller's concerns-based model of teacher development. *Teaching and Teacher Education*, Vol. 19, No. 5, pp. 465–482.
Curtner-Smith, M. (2002), "Methodological Issues in Research." In *The Sociology of Sport and Physical Education. An Introductory Reader.* A. Laker, (ed), pp. 36–57. London: Routledge/Falmer.

Dudley, P. (2012), Lesson Study development in England: from school networks to national policy. *International Journal for Lesson and Learning Studies,* Vol. 1, No. 1, pp. 85-100.

Elliott, J. (2012), Developing a science of teaching through Lesson Study. *International Journal of Learning and Lesson Study*, Vol.1, No. 2, pp. 108-125.

Eraut, M. (1995), Schön shock: A case for reframing reflection-in–action. *Teachers and Teaching,* Vol. 1, No. 1, pp. 9-22.

Fernandez, C. Cannon, J. and Chokshi, S. (2003), A US-Japan lesson study collaboration reveals critical lenses for examining practice. *Teaching and Teacher Education*, Vol. 19, No. 2, pp. 171-185.

Fernandez, C. (2002), Learning from Japanese approaches to professional development: The case of Lesson Study. *Journal of Teacher Education*, Vol. 53, No. 5, pp. 393–405.

Fernandez, M. L. (2010), Investigating how and what prospective teachers learn through microteaching Lesson Study. *Teaching and Teacher Education*, Vol. 26, No. 2, pp. 351–362.

Frudden, S.J. (2001), Lesson plans can make a difference in evaluation teachers. *Education*, Vol. 104, No. 4, pp. 351–353.

Fuller, F. (1969), Concerns of teachers: a developmental conceptualisation. *American Educational Research Journal*, Vol. 6, No. 2, pp. 207-226.

Fuller, F. and Brown, O. (1975), Becoming a teacher. In: K.Ryan (Ed.), *Teacher education (74th Yearbook of the National Society of Education*, pp. 25–52). Chicago: University of Chicago Press.

Furlong, J., and Maynard, T. (1995), *Mentoring student-teachers: the growth of professional knowledge.* London: Routledge.

Gibbs, G.R. (2002), *Qualitative data analysis: explorations with NVivo.* Buckingham: Open University Press.

Gore, J. (1990), Pedagogy as text in physical education teacher education: Beyond the preferred reading. In: Kirk D and Tinning R (eds) *Physical Education, Curriculum, and Culture: Critical Issues in the Contemporary Crisis.* London: Falmer Press, pp.101–138.

Gower, C. (2010), Planning in PE. In S. Capel and M. Whitehead (eds) *Learning to teach physical education in the secondary school. 3rd edition.* London: Routledge, pp. 24-45.

Gower, C. and Capel, S. (2004), Newly qualified physical education teachers' experiences of developing subject knowledge prior to, during and after a Postgraduate Certificate in Education course*, Physical Education and Sport Pedagogy,* Vol. 9, No. 2, pp. 1–19.

Graham, G., Hopple, C., Manross, M. and Sitzman, T. (1993), Novice and experienced children's physical education teachers: Insight into their situational decision making. *Journal of Teaching in Physical Education,* Vol. 12, No. 2, pp. 197-214.

Grossman, P., and McDonald, M. (2008), Back to the future: directions for research in teaching and teacher education. *American Educational Research Journal,* Vol. 45, No. 1, pp. 184–205.

Gurl, T. (2011), A model for incorporating Lesson Study into the student teaching placement: what worked and what did not? *Educational Studies,* Vol. 37*,* No. 5, pp. 523–528.

Hall, T.J. and Smith, M.A. (2006), Teacher Planning, Instruction and Reflection: What We Know About Teacher Cognitive Processes. *QUEST,* Vol. 58. No. 4, pp. 424-442.

Hastie, P. and Glotova, O. (2012), Analysing qualitative data. In. K. Armour and D.Macdonald (eds*), Research methods in physical education and youth sport*, London: Routledge, pp. 309-321.

Herold, F. and Waring, M. (2011), So much to learn, so little time ….: pre-service physical education teachers' interpretations and development of subject knowledge as they learn to teach. *Evaluation and Research in Education*, Vol. 24, No. 1, pp. 61-77.

Korthagen, F., Loughran, J., and Russell, T. (2006), Developing fundamental principles for teaching education programs and practises. *Teaching and Teacher Education*, Vol. 22, No. 8, pp. 1020–1041.

Lamb P., Lane K. and Aldous D. (2013), Enhancing the spaces of reflection: A buddy peer review process within Physical Education Initial Teacher Education. *European Physical Education Review,* Vol. 19, No. 1, pp. 21-38.

Lawson, H.A. (1983), Toward a model of teacher socialization in physical education: the subjective warrant, recruitment, and teacher education (part 1), *Journal of Teaching in Physical Education*, Vol. 2, No. 3, pp. 3–16.

Leavy, A.M. (2010), The challenge of preparing pre-service teachers to teach informal inferential reasoning. *Statistics Education Research Journal*, Vol. 9 No. 1, pp. 46-67.

Le Cornu, R. (2005), Peer mentoring: Engaging pre-service teachers in mentoring one another. *Mentoring and Tutoring,* Vol. 13, No. 3, pp. 355–366.

Lee, G. and Wu, C.C. (2006), Enhancing the teaching experience of pre-service teachers through the use of videos in web-based computer-mediated communication (CMC). *Innovations in Education and Teaching International,* Vol. 43, No. 4, pp. 369–380.

Lewis, C. (2002), "Does lesson study have a future in the United States"? *Nagoya Journal of Education and Human Development,* No.1, pp. 1–25.

Lewis, C. and Tsuchida, I. (1997), Planned educational change in Japan: The case of elementary science instruction. *Journal of Educational Policy*, Vol. 12, No. 5, pp. 313-331.

Lewis, C. C., Perry, R. R., and Hurd, J. (2009), Improving mathematics instruction through lesson study: A theoretical model and North American case. *Journal of Mathematics Teacher Education*, Vol. 12, No. 4, pp. 285-304.

Lewis, J., Fischman, D., Riggs, I. and Wasserman, K. (2013), Teacher learning in Lesson Study. *The Mathematics Enthusiast,* Vol. 10, No. 3, pp. 583-620.

Lim, C., Lee, C., Saito, E., and Syed Haron, S. (2011), Taking stock of lesson study as a platform for teacher development in Singapore. *Asia-Pacific journal of teacher education*, Vol. 39, No. 4, pp. 353-365.

Loewenberg-Ball, D., Thames, M. H. and Phelps, G. (2008), Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, Vol. 59, No. 5, pp. 389-407.

Loughran, J.J. (1996), *Developing reflective practice. Learning about teaching and learning through modelling*. London: Falmer Press.

MacPhail, A., Gorley, T. and Kirk, D. (2003), Young people's socialisation into sport: A case study of an athletics club. *Sport, Education and Society*, Vol. 8, No. 2, pp. 251-267.

Marble, S. T. (2006), Learning to teach through Lesson Study. *Action in Teacher Education*, Vol. 18, No. 6, pp. 935–953.

Marble, S. T. (2007), Inquiring into teaching: Lesson study in elementary science methods. *Journal of Science Teacher Education,* Vol. 28, No. 3, pp. 86–96.

McBer, H. (2001), Research into teacher effectiveness, in Banks, F and Shelton-Mays, A. (Eds), *Early Professional Development of Teachers*, David Fulton Publishers. London, pp. 193-209.

McNiff, J. and Whitehead, J. (2002), *Action Research: Principles and Practice.* London & New York: RoutledgeFalmer.

Miller, K. and Zhou, X. (2007), Learning from classroom video: What makes it compelling and what makes it hard. In: R. Goldmann, R. Pea and B. Barron (eds) *Video Research in the Learning Sciences*. Mahwah, NJ: Lawrence Erlbaum, pp.321–334.

Ono, Y. & Ferreira, J. (2010), A case study of continuing teacher professional development through lesson study in South Africa. *South African Journal of Education*, Vol. 30, No.1, pp. 59-74.

Parks, A.N. (2008), Messy learning: Pre-service teachers' lesson-study conversations about mathematics and students. *Teaching and Teacher Education*, Vol. *24,* No. 5, pp. 1200–1216.

Patton, M. Q. (2002), *Qualitative Research and Evaluation Methods*. Thousand Oaks, CA: Sage Publications.

Pigge, F. L. and Marso, R. N. (1997), A seven-year longitudinal multi-factor assessment of teaching concerns development through preparation and early years teaching. *Teaching and Teacher Education,* Vol.13, No. 2, pp. 225–237.

Puchner, L. and Taylor, A. (2006), Lesson Study, collaboration and teacher efficacy: Stories from two school-based math Lesson Study groups. *Teaching and Teacher Education*, Vol. 22, No. 7, pp. 922-934.

Richardson, V., & Placier, A. (2001). Teacher change. In V. Richardson (Ed.), *Handbook of research on teaching* (4th ed.). Washington, DC: American Educational Research Association, pp. 905-947.

Rovegno, I. (1992), Learning to reflect on teaching: A case study of one pre-service physical education teacher. *The Elementary School Journal,* Vol. 92, No. 4, pp. 491-510.

Ruys, I., Van Keer, H. and Aelterman, A. (2012), Examining pre-service teacher competence in lesson planning pertaining to collaborative learning. *Journal of Curriculum Studies*, Vol. 2, No. 3, pp. 349-379.

Romano, M. and Schwartz, J. (2005), Exploring technology as a tool for eliciting and encouraging beginning teacher reflection. *Contemporary Issues in Technology and Teacher,* Vol. 5, No. 2, pp. 149-168.

Santagata, R. (2009), Designing video-based professional development for mathematics teachers in low performing schools. *Journal of Teacher Education*, Vol. 60, No. 1, pp. 38-51.

Schon, D. A. (1983), *The reflective practitioner: How professionals think in action.* New York: Basic Books.

Schumm, J., Vaughn, S., Haager, D., McDowell, J., Rothlein, L., and Saumell, L. (1995), General education teacher planning: What can students with learning disabilities expect? *Exceptional Children,* Vol. 61, No. 4, pp. 335–352.

Scott, W. and Spencer, F. (2006), Professional development for inclusive differentiated teaching practice. *Australian Journal of Learning Disabilities,* Vol.11, No. 1, pp. 35-44.

Sherin, M. and van, Es E. (2005), Using video to support teachers' ability to notice classrooms interactions. *Journal of Technology and Teacher Education*, Vol. 13, No. 3, pp. 475–491.

Simms, L. and Walsh, D. (2009), Lesson Study with preservice teachers: lessons from lessons. *Teaching and Teacher Education*, Vol. 25, No. 5, pp.724-733.

Sirna, K., Tinning, R. and Rossi, T. (2008), The social tasks of learning to become a physical education teacher: Considering the HPE subject department as a community of practice. *Sport Education and Society*, Vol. 13, No. 3, pp. 285–300.

Stigler, J. and Hiebert, J. (1999), *The teaching gap.* New York, NY: The Free Press.

Tinning, R. (1988), Student teaching and the pedagogy of necessity. *Journal of Teaching in Physical Education,* Vol. 7, No. 2, pp. 82-90.

Tsangaridou, N. (2005), Classroom teachers' reflections on teaching physical education. *Journal of Teaching in Physical Education,* Vol. 24, No. 1, pp. 24–50.

Thompson, M. L. (1963), Identifying anxieties experienced by student teachers. *Journal of Teacher Education*, Vol. 14, No. 4, pp. 435-439.

Tomlinson, C. (1995), Deciding to differentiate instruction in middle school: One school's journey. *Gifted Child Quarterly,* Vol. 39, No. 2, pp. 77–87.

Tomlinson, C. A., Brighton, C., Hertberg, H., Callahan, C. M., Moon, T. R., Brimijoin, K. and Reynolds, T. (2003), Differentiating instruction in response to student readiness, interest, and learning profile in academically diverse classrooms: A review of literature. *Journal for the Education of the Gifted*, Vol. *27*, No. 2-3, pp. 119-145.

Van Manen, M. (1977), Linking ways of knowing with ways of being practical. *Curriculum Inquiry,* Vol. 6, No. 3, pp. 205-228.

Van Maanen, J. and Schein, E.H. (1979), Toward a theory of organizational socialization, in: B. Staw (Ed.) *Research in Organizational Behavior* (pp. 209–261) (Greenwich, CT, JAI Press).

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* Cambridge, UK: Cambridge University Press.

Yinger, R.J. (1977), *A study of teacher planning: Description and theory development using ethnographic and information processing methods.* Unpublished doctoral dissertation, Michigan State University, East Lansing.

Zeichner, K. and Liston D. (1987), Teaching student teachers to reflect. *Harvard Educational Review,* Vol. 57, No. 1, pp. 23-48.

Zeichner, K.M. and Tabachnik, B.R. (1981) Are the effects of university teacher education 'washed out' by school experience? *Journal of Teacher Education*, Vol. 32, No. 3, pp. 7–11.

Zhang, M., Lundeberg, M., Koehler, M, and Eberhardt, J. (2011), Understanding affordances and challenges of three types of video for teacher professional development. *Teaching and Teacher Education,* Vol. 27, No. 2, pp. 454-462.

Appendix 1(a)**: Individual Questionnaire (Placement 'A')**
a) Please describe the process of conducting the lesson study process between yourself and your paired placement peer.
b) To what extent did you find the lesson study process useful, and if so, in what ways?
c) Were there any elements of the lesson study process you found difficult or a challenge, and if so, how did the issues impact on the process?
d) Were there any benefits for you talking part in the lesson study process with your paired peer, and if so, what?
e) Were there any benefits for your paired placement peer in taking part in the lesson study process with you, and if so, what?
f) Since completing the lesson study process, do you feel your teaching has changed and if so, what impact has this change made to the learning of pupils?
g) Has your involvement in Lesson Study influenced the way you assess your students' learning? (Yes/Not Sure/No)? If the answer is 'yes' then give examples.

Appendix 1(b)**: Individual Questionnaire (Placement 'B')**
a) Please describe the process of conducting the lesson study between yourself and your peer.
b) Were there any elements of the lesson study you found especially useful in your development as a teacher?
c) Were there any elements of the lesson study you found difficult or a challenge, and if so, what?
d) Were there any benefits from completing the lesson study with a peer, and if so, what?
e) Do you think there were there benefits your peer may have gained from completing the lesson study with you, and if so, what?
f) What were the key changes made to the lesson plan after the first lesson?
g) What was the impact of these changes on the revised lesson?
h) Has your involvement in the lesson study influenced the way you assess your students' learning? (Yes/Not Sure/No)? If the answer is 'yes' then give examples.

h) Since completing the lesson study, have you made any significant changes to your teaching, and if so, what?
i) In what way (if any) has lesson study influenced how you think about teaching?
j) In what way (if any) has lesson study influenced how you think about learning?

Appendix 2: Group Discussion Board on the Virtual Learning Environment (VLE)

Now that you have completed a peer-learning lesson study task during this placement, please share your reflections on the lesson study experience considering the following prompts:
1) The experience of watching a recording of yourself teaching with a peer and discussing it with them;
2) What you have learnt from watching a recording of yourself teaching a PE lesson;
3) Usefulness of feedback from a peer about your lesson;
4) What you have learnt from watching the recording of a peer teaching;
5) What you have learnt from discussing a peer's lesson with them after watching the recording;
6) Strategies adopted for giving feedback to a peer after watching them teach a lesson and how you found this stage of the process;
7) Usefulness of the lesson study process in helping you to develop reflective abilities.

Appendix 3: Individual interview questions
a) Tell me a bit about how you conducted the lesson study with your peer.
b) Can you remember what the main changes were that you identified between lessons?
c) Thinking back to the initial lesson and then the revised lesson, how do you feel the revised lesson developed learning opportunities for the class?
d) How did you find teaching the revised plan as the second teacher, having seen the lesson taught once?
e) Thinking about the different elements to the cycle, the stages that you went through, were there any stages of the process you found really helpful for you?
f) Can you identify any key things you feel you have learnt from working with your peer on the lesson study?
g) Were there any challenges in completing the lesson study with a peer?
h) Did you take anything away with you after the lesson study with your peers that you have adopted in your own practice more broadly?
i) In what ways do you think taking part in lesson study can help a pre-service teacher?

About the author
Dr Penny Lamb is a Senior Lecturer in Education at the School of Education and Lifelong Learning, University of East Anglia. Dr Penny Lamb can be contacted at: penny.lamb@uea.ac.uk.