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How lesson study is used in initial teacher education: an international review of literature

Viv Baumfield ^a, Alison Bethel ^b, Chris Boyle ^c, Will Katene ^a, Helen Knowler ^a, George Koutsouris ^a and Brahm Norwich ^a

^aGraduate School of Education, University of Exeter, Exeter, UK; ^bCollege of Medicine and Health, University of Exeter, Exeter, UK; ^cSchool of Education, University of Adelaide, Adelaide, Australia

ABSTRACT

This article focuses on the use of lesson study (LS) in initial teacher education (ITE) from a mapping review of international research published in peer-reviewed journals. This method enables identification of characteristic features of the research field along with any gaps in the existing evidence base. The authors map out variations in ITE LS practices by employing a seven-dimensional framework of LS to illustrate the range and draw conclusions about the design and use of LS in ITE. They conclude that LS is an example of teacher enquiry-based practice, identified by researchers as one of the means of building the capacity for a self-improving education system. LS and related practices play a crucial role in preparing teachers to adopt a research orientation to their own practice. However, the article also discusses the organisational challenges and the balance between acquiring skills and reflection for beginning teachers when introducing LS into ITE.

ARTICLE HISTORY

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KEYWORDS

Lesson study; initial teacher education; literature review; teacher enquiry-based practice

Introduction

This article summarises a review of international literature about how lesson study is used and with what purposes in initial teacher education (ITE). Lesson study (LS) is a collaborative reflective professional development approach which has its origins in Japan in the late nineteenth century and which has been adopted and adapted internationally especially over the last 20 years. LS combines practice and theory, with the aim of promoting a deep look into students' learning, on one hand, and teaching and curricular programmes, on the other. It has relevance to practising and prospective teachers. As a form of teacher research or study, this involves elements of deduction (using curriculum and research knowledge) and induction (deriving knowledge from teacher enquiry). LS has been represented as involving a study-plan-teach-review process in which there is a study phase between the review and planning phases (Lewis 2009) (see Figure 1).

CONTACT Brahm Norwich  b.norwich@ex.ac.uk  Graduate School of Education, University of Exeter, Heavitree Road, Exeter, UK

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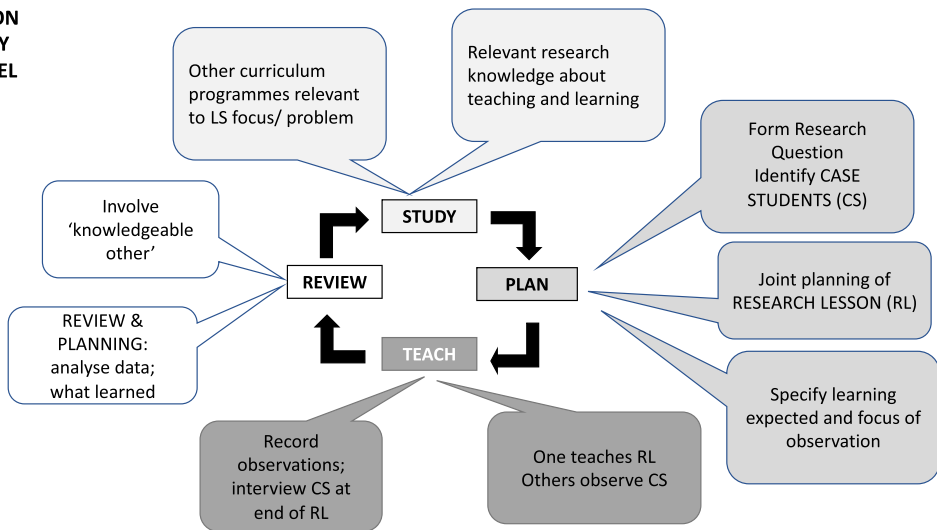
LESSON STUDY MODEL

Figure 1. Lesson study process.

Our interest in gaining a better understanding of the use of LS in ITE was triggered by an attempt to understand how LS practice might be integrated into a particular higher education institution ITE programme in the UK, where the authors are based. This specific programme draws upon research into work-place learning to develop a situated learning approach to ITE (Skinner 2010) designed to bridge what has been characterised as a 'yawning gap' (McIntyre 2009) between the beginning teachers' learning in the context of the university and in schools. We identify three basic processes as necessary for the integration of professional knowledge across these settings which have some similarity with LS:

- models to help guide ITE students' activities in the school context;
- practice in trying out activities for themselves;
- feedback to facilitate judgement by the ITE students as to how well they are carrying out the activities.

Despite the conditions being conducive to the introduction of LS, securing its place within this programme has proven difficult (Fujita and Hall 2018). This article outlines what we can learn about the use of LS in ITE from a mapping review of international research published in peer-reviewed journals in the English language. Mapping reviews provide a transparent means of representing what is known, and not known, and what it would be useful to find out more about (Grant and Booth 2006).

When is a lesson study not a lesson study?

Whilst in Japan and China LS is embedded in schools as a well-established practice, it was not until the publication of research into the achievement gap exposed by the International Trends in Mathematics and Science Study (TIMSS) that LS attracted wider

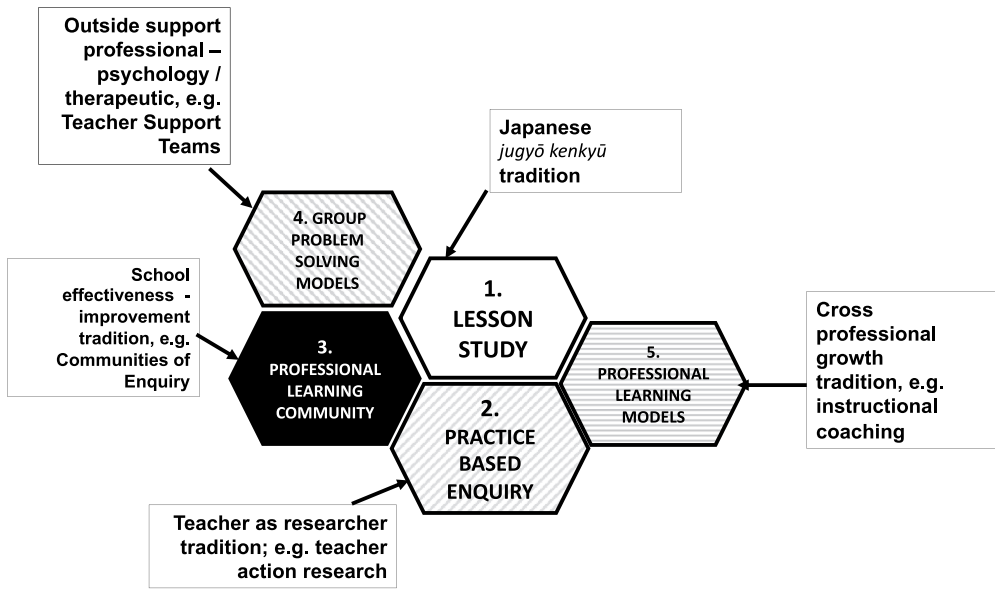


Figure 2. Family of professional models and their contexts.

international interest (Stigler and Hiebert 1999). With the increased popularity of LS came a degree of variation that has led to it becoming an ‘umbrella term’ covering a range of practices (Xu and Pedder 2015). Some variation and adaptation to local contexts is what would be expected and has been the case in Japan and China over time. This raises the question about how much the approach can be modified before its key characteristics are lost. Two recent literature reviews with a focus on the use of LS in ITE (Larsen et al. 2018; da Ponte 2017) highlight the need for clearer definitions and further study about how LS aims are defined, participants’ relationships in LS teams and how LS practices are adapted and simplified. We decided to use a conceptual framework of LS dimensions to clarify the purposes and practices of LS in the context of ITE (Norwich 2018). These dimensions were identified from a systematic comparative analysis of 20 well-known, empirically researched and documented practices in five traditions of LS and LS-related practices (Norwich 2018; for more detail about the basis for this conceptual framework, see Figure 2). This framework provides a basis to analyse similarities and differences in specific practices within the lesson study tradition that includes learning studies. Its usefulness for this review is that it specifies important dimensions and so promotes clarity about professional learning practices.

The following version of the conceptual framework was used in this review.

Dimensions of LS used in this review

1. Settings in which LS done
2. Purposes for using LS
3. Study methodology used
4. Knowledge bases used
5. Focus of enquiry/development

6. Relationships of LS participants
7. Specific procedures involved in practice:

- (I) number of research lessons;
- (II) number of review & planning meetings;
- (III) reteach revised lesson;
- (IV) group members;
- (V) duration of LS practice;
- (VI) assessment of learning/change;
- (VII) nature of group communication;
- (VIII) learner involved in learner review.

The particular aims of this review

- (1) To map out international variations in LS practices used in peer-reviewed papers about LS use in initial teacher education.
- (2) To test and further develop the seven-dimensional framework of LS variations in reviewing the initial teacher education use of LS.
- (3) To illustrate this variation with examples of LS use in the context of ITE.
- (4) To draw conclusions about the design and variations of LS use with pre-service teachers.

We assume that examples of LS use in ITE are not only to be found in peer-reviewed academic papers, but also in books, written guidance, websites etc., and also published in other languages. We have had to confine our search to those in English, for practical reasons, and recognise this as a limitation. We have focused only on peer-reviewed academic journals as we take these sources to reach a minimum standard of detail about the use of LS and the adequacy of the LS practice in ITE. It is also important to note that the above aims are not about evaluating the quality of LS processes or outcomes.

Search methods

Electronic searching

We conducted a literature search using the following terms: pre-service OR initial teacher education AND lesson study OR learning study. The following databases were searched with the above search terms in November 2018: *British Education Index*, *Educational Research Complete* and *ERIC*.

Inclusion criteria

To be included in the review, studies had to be:

- relevant to LS as an approach, as opposed to just referring to 'lesson' and 'study';
- about learning study, if LS as a term or approach was not used (given the links between LS and learning study);

- conducted in relation to ITE, as opposed to in-service teaching (with some exceptions as in some cases, e.g. Japan, in-service teachers are still considered to be trainees for a particular period of time);
- peer-reviewed (so, e.g., doctoral theses were excluded);
- reports of empirical findings (LS guidebooks or reviews were excluded);
- written in English, yet the study could have been conducted in any context.

Study selection

The retrieved titles and abstracts were initially screened by two researchers for relevance; disagreements were resolved by discussion. Full-text copies of potentially relevant records were then obtained (see end). The retrieved records were again assessed for inclusion by the authors. Most papers were double-screened and discrepancies were resolved by discussion, where necessary (Figure 3).

Data extraction

Data were extracted from the final 51 included texts by all the authors and put into a data extraction form, which had been piloted previously on several articles and refined. The data extraction followed the seven-dimension conceptual framework of Table 1 and some additional areas (Figure 4). Data were extracted independently by each of the authors, and where different papers reported on the same LS project, the data were combined at this stage. Nine papers were double-extracted (around 20%), and then the results were compared and disagreements discussed. This moderation exercise revealed many similarities in the data extracted, with some differences in the following three areas:

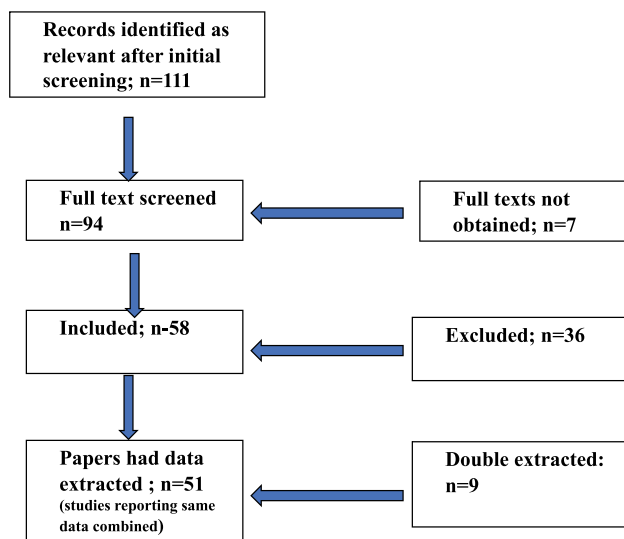


Figure 3. Flow diagram depicting records identified, included and excluded.

Table 1. Dimensions of LS used in this review.

1. Settings in which LS done
2. Purposes for using LS
3. Study methodology used
4. Knowledge bases used
5. Focus of enquiry/development
6. Relationships of LS participants
7. Specific procedures involved in practice:
(I) number of research lessons;
(II) number of review & planning meetings;
(III) reteach revised lesson;
(IV) group members;
(V) duration of LS practice;
(VI) assessment of learning/change;
(VII) nature of group communication;
(VIII) assessment of learning/change;
(IX) learner involved in learner review

- Relationship of LS participants: expertnovice vs. facilitatorparticipant: Reviewers in some cases did not agree about the nature of the relationship of LS team members. This was about experience (either in relation to LS or the subject matter) and power. This arose when these relationships were not explicitly discussed in most papers.
- Focus of LS: specific teaching actions vs. planning and teaching the lesson: LS projects with multiple foci made it difficult for reviewers to agree on a central one, especially when foci converged. For instance, was the LS focus on specific teaching actions or on the lesson as a whole?
- Study design: case studies vs. demonstration; and demonstration vs. exploratory: Some papers, e.g. particularly reporting demonstration projects, did not explicitly identify a research design, leading to disagreements between reviewers.

Differences were discussed and subsequently resolved in team meetings.

LS context:
Country:
Funding:
Setting:
Teaching phase / type of course:
Curriculum area:
Research paper aspects:
Type of design:
ITE LS paper aims analysis:
Main findings: themes
Evaluation / research quality and limitations:
7 Dimensions of LS variation: (as in Table 1)

Figure 4. Template for data extraction.

Seven dimensions of LS variation¹

1. LS setting

LS use in ITE is worldwide with studies in the following countries identified: USA (the largest group, $n = 18$), followed by the UK ($n = 7$), Ireland ($n = 5$), Japan ($n = 3$), Malaysia ($n = 3$) and Canada, Denmark, Greece, Hong Kong, Indonesia, Norway, Philippines, Spain, Switzerland, Thailand and Turkey all represented. Of the 51 studies, 29 gave no information about either the ITE programme or phase. Five studies involved primary or elementary trainee teachers (depending on the country context), and nine, secondary trainee teachers. Ten studies were in the context of an undergraduate teacher training course, and three studies involved postgraduate trainees. Twenty-eight of the included studies involved collaboration between teacher mentors in school classrooms and university-based tutors. Ten of the included studies were simulations, with the trainee teachers assuming student roles, and in 10 studies ITE was entirely based in schools. Only 9 of the 51 included studies acknowledged receipt of research funding.

2. Specific LS purposes

Most of the studies focused on increasing trainee teachers' knowledge of subject matter and pedagogic skills ($n = 7$) or aimed to do this in addition to other purposes ($n = 31$). Where there were additional purposes, these were:

- to provide opportunities for participants to unite pedagogical and disciplinary knowledge in addressing teaching problems ($n = 16$);
- to increase the ability to observe students ($n = 7$), to make stronger collegial networks ($n = 5$); and
- to improve school student learning ($n = 5$).

In addition, studies focused on developing reflective teaching ($n = 5$), increasing teacher motivation and efficacy ($n = 3$) and developing curriculum programmes to strengthen connection between daily practice and longer-term goals ($n = 4$), improve quality of lesson plans ($n = 3$) and implement nationwide curriculum change ($n = 1$). Studies also used LS to engage experienced teachers in professional development ($n = 2$), focus on mentoring relationships ($n = 2$), general skill development for teachers ($n = 1$), to evaluate curriculum and classroom practice ($n = 1$) and develop maths reasoning ($n = 1$). Finally, one study focused on how preservice teachers engage in informal inferences when designing/teaching lessons, and another one on integrating prospective teachers into departmental collaborative working practices.

3. Study methodology

Most studies were categorised as action research studies ($n = 18$), with only one study described as a learning study, a hybrid between LS and design-based research (Collins, Joseph, and Bielaczyc 2004). However, the majority of studies did not specify a particular methodological approach ($n = 33$ of 51). With regards to the study logic (inductive or

deductive), 12 studies were seen as taking an inductive approach focusing on the use of teacher craft/implicit knowledge, whereas 18 took a deductive approach starting from a learning and/or teaching theory. However, another 18 studies could not be categorised in this way. A smaller number of studies was seen as involving a combination of induction and deduction ($n = 4$).

4. Knowledge bases used

With regards to the knowledge bases used, 22 studies drew on curriculum programme knowledge, 37 studies on subject specific-pedagogic knowledge, and five studies on knowledge about learning: variation theory ($n = 3$), anthropological theory of the 'didactic' ($n = 1$) and Vygotsky's social development theory ($n = 1$).

5. Focus

With regard to the focus of the LS, some studies had more than one focus. The most frequent focus was on specific teaching actions or approaches ($n = 39$). This more specific focus was more frequent than LSs which focused on the whole lesson ($n = 13$). Sometimes the LS focus on lessons was part of a focus on specific curriculum programmes ($n = 8$). These LS foci on teaching were more frequent than the LS focus on student learning ($n = 13$), which is often presented as one of the key features of LS. Two studies referred to the focus as being on collaboration between mentor/trainee ($n = 1$) and another on teacher learning ($n = 1$). As noted above, reviewers found it difficult to categorise the LS focus given that the foci were multiple and often implicit.

6. LS group relationships

The kind of relationships within the LS groups or teams was also difficult to categorise as discussed above, as the papers were often not explicit about this feature of LS practices. Three broad kinds of relationships were identified, and these were evident across the papers in roughly the same frequencies: expert–novice ($n = 17$), facilitator–participant ($n = 14$) and parity–equality ($n = 12$). However, group relationships in 11 papers were identified as reflecting a mix of two of these kinds: facilitator–participant & expert–novice ($n = 5$) and parity–equality & expert–novice ($n = 5$). In two papers, all three kinds were categorised as present.

7. Procedures

Number of research lessons

Details about this aspect were sometimes missing in the papers. The most frequent number of research lesson in ITE LS practice was two research lessons ($n = 19$). Three other papers identified between two and four research lessons being used. However, the second most frequent number of research lessons was only one such lesson ($n = 11$). Even less LS practice used between two and seven research lessons ($n = 6$). There was missing information in 17 papers.

Review and planning meetings

There was even more missing information about the LS review and planning meetings ($n = 25$). This might be because of variations in how the reflective LS group meetings were described in the papers. This is reflected also in there being no clear link between the number of research lessons and the number of review and planning meetings, which would be expected if there were such meetings before and after research lessons. The most frequent number of such meetings was one review and planning meeting in an LS ($n = 7$). The second most frequent number of such meetings was three review and planning meetings ($n = 6$).

Revised research lessons

An even higher proportion of LSs described in the papers did not contain clear information about whether revised research lessons were retaught or not in a subsequent research lesson ($n = 33$). Where there was information, slightly more revised research lessons were not taught ($n = 10$) than revised and retaught ($n = 8$).

Learner focus

The whole class was the most frequent learner focus in this ITE LS practice ($n = 27$). The focus on identified student learners (case pupils) was much less frequent ($n = 4$), while there were several LSs where the learner focus was not students but the trainee teachers ($n = 6$). There was still some missing information, but less than the above features of ITE LS practice ($n = 13$).

Duration of LS practice

Here again, many papers did not specify the duration of LS practice ($n = 20$). Some did so in weeks, with between 6 and 10 weeks as the most frequent duration ($n = 11$); with some being less than this ($n = 6$ for 1–5 weeks) and some more ($n = 5$ for 11–15 weeks). A few papers specified duration in terms ($n = 4$: 2 for one term and 2 for two terms) or semesters ($n = 3$ for one semester).

LS group members

In a minority of LSs, there were only trainee teachers in the LS groups ($n = 14$), of which most had more than two trainees ($n = 13$); in one case only were there two trainees in an LS group. The most frequent grouping was trainees with their training tutor ($n = 28$), with most of these being trainees with only their tutors ($n = 20$). Sometimes the trainees and their tutors also had the class teacher ($n = 6$), and one study also had the class teacher and a researcher ($n = 1$). In one study the trainee and tutor also had a support professional. Sometimes the trainee only had the class teacher in the LS group ($n = 2$), and once this pair also had a researcher in the group. Unclear or missing information was less frequent for this feature of LS practice.

Assessment of professional learning/change

The two most frequent assessment methods involved direct observation ($n = 32$) and video recordings ($n = 11$). Pre–post LS change assessment was used less frequently ($n = 2$), as well as reflective reports ($n = 2$), and each of the following was used once: audio transcription, post-LS questionnaire and written task. In some cases various methods were combined, with a few papers not specifying the methods used ($n = 6$).

How groups communicated

Though most papers did not specify this, where this is explicit in the paper, communication was by all group members present in the review and planning meetings ($n = 17$), with none communicating through video-linked methods.

Illustrative examples of LS use in the context of ITE

From the range of LS practice shown in the reviewed papers, we selected two examples to reflect LS practices that were not typical of those analysed above. The purpose of using these examples was (i) to illustrate the range of use of LS in ITE by focusing on some outliers and (ii) to show how the dimensions in the framework used in this review provide a structure for a detailed and relevant account of LS use in ITE. The two examples have in common that they are in programmes where universities have a strong relationship with practice schools. But they differ in their specific LS aims, the procedures involved and the focus of the lesson study. The first US example uses LS to bridge professional learning between campus and school classroom, with LS used in both settings. The second Norwegian example links LS into a national ITE school mentoring system, using LS to enhance trainee teacher mentoring practices.

In the first example, Mostofo and Zambo (2015) describe an undergraduate secondary education mathematics use of LS at Grand Canyon University, Arizona, USA. This use of LS allowed preservice teachers to teach in their methods classroom before teaching in the field experience. Previously the field experience had only involved students observing secondary maths class teaching. The first author who ran this course wanted to connect his methods classroom to the field-experience classroom. This would enable the preservice teachers to practise-teach the exact lessons in his class before teaching them in their field-experience classroom. This took place in a 16-week course over the period of a semester with three 65-minute campus sessions and the 15-hour field experience.

This LS involved a university and school collaboration. The specific purpose for using LS was to increase teachers' knowledge of the maths subject matter (in this case algebra) and relevant pedagogic skills through more teaching in the university methods sessions and to better connect the methods sessions to real classroom teaching. The conception of the study methodology of LS was action research using the mathematics subject pedagogic knowledge of the university course as the knowledge base for the LS. The LS team consisted of three students with the course

tutor in which the working relationship involved the tutor as the expert and the students as novices. There was a designated maths class teacher where the field experience took place, who was briefed about the LS process.

There were two phases of LS. In phase 1 there were two rounds of LS on campus. Each team planned a research lesson (plan, activities & materials) and consulted their tutor for feedback that resulted in revisions. One student taught the research lesson in the maths class to the others present followed by a review with the tutor present. The research lesson was then revised collaboratively for another round of teaching. Between these rounds the tutor also modelled teaching followed by collaborative reviews. A second student then taught the revised research lesson followed by a collaborative review. The final revision of the research lesson was submitted for tutor assessment.

In phase 2, LS was used to prepare directly for the field experience class teaching by focusing on a topic identified by the field experience partner teacher. The LS teams worked in similar ways to phase 1. Each student took a turn in teaching the collaboratively planned and revised research lesson. After three rounds of research lessons, the final revised research lesson was then taught by each member of the team in the school classroom. The LS team observed the research lesson and made video recordings of the whole class learning. There was no evidence of consulting the maths pupils about their learning in the research lessons. The paper also did not give details of the focus of the observations, which were then analysed as a campus-based review in the maths course sessions.

This research into initial teacher education use of LS involved an action research model with LS in the maths course as a case study. The data analysed involved weekly student reflections on the process and summative interviews. The findings were taken to show that LS engaged the preservice teachers in collaboratively creating, field testing, revising and re-teaching lessons in their field placement classroom. The action research was taken to show the importance of collaborative lesson preparation, practice teaching and observations of other teachers. The preservice teachers successfully transitioned from teaching in the methods classroom to their field-experience classroom, which enhanced their confidence as they entered student teaching. It was concluded that LS was an effective strategy for enhancing the efficacy of preservice teachers.

In the second example, Munthe, Bjuland, and Helgevold (2016) describe a Norwegian use of LS in a four-year Bachelor of Education initial teacher training course for Maths, Physical Education, Science and English student teachers preparing for grades 1–7 and 5–10. The rationale for using LS was as an intervention that could shift pre-service teachers' focus from themselves to their pupils, attempting to enable them to learn more about the consequences of their teaching for their pupils. LS was selected to focus on the mentoring sessions which are integral to the Norwegian mentoring model developed in the 1980s. This sets out how to support professional learning in schools and to conduct mentoring during ITE field practice. Mentoring in this model involves starting with the mentee's own needs and definition of 'the problem' and brings up the topics that s/he wishes to discuss with the mentor, who is a school teacher. In this use of LS, the mentoring sessions were treated as the review and planning meetings in an LS cycle. So, the project was interested

in whether and how the use of lesson study during ITE could bring about improved learning that would support student teachers' understanding of their pupils' needs, both academically and socially.

This use of LS took place in a University–School partnership setting, with student teachers being involved in the spring term of the second year of the four-year course for two successive year groups. The project was designed with the usual mentoring practices in the first year and the use of LS in the teacher mentoring practices in the second year. Overall, there were 55 volunteer trainees and 17 mentor teachers forming 16 teams. In the LS version of mentoring, school-based mentors were trained in LS over three seminars. By the end of the seminars the mentors decided how to implement LS in a three-week placement period.

LS in this ITE use involved an action research methodology with the knowledge base informing the LS being subject pedagogic knowledge relevant to each of the four subjects involved. The school-based LS teams involved the trainee teachers and the teacher mentor.

Given the Norwegian mentoring model, the relationships between student teacher and teacher mentor could be characterised as that of facilitator–participant. In the LS version of mentoring, the sequence was as follows: i. prior mentoring session; ii. teaching the research lesson; iii. 'in-between' mentoring session to reflect on observations of research lesson, revise lesson to improve learning, or learn about pupils' learning; iv. teaching the revised lesson; and v. final mentoring session. This sequence took place over a three-week period. Monitoring the research lesson involved not only observations, but also interviewing a case/focus student at the end of the lesson.

This use of LS in ITE involved an evaluation that the authors called a lagged quasi-experimental design. For both mentoring as usual and the LS version of mentoring, there were pre/post interviews of participants for both conditions, videos of the mentoring sessions and class teaching. The findings of the comparative analyses of data showed that the use of LS resulted in more collaborative inquiry among the pre-service teachers. At its best, the pre-service teachers formulated research questions, took an active part in observations and used data (pupils' work, interviews and observations) to inform their choices about how to create improved learning for their pupils. The authors describe this as a form of collaborative inquiry.

Discussion of the design and use of LS in ITE

The 51 papers reviewed showed that 16 different countries were represented, with most ITE LS in the USA. ITE LS was also represented in European countries (e.g., UK, Ireland, Denmark, Norway), but relatively few from Japan. This probably reflects that the reviews were in English and that Japanese ITE practice might not be researched and written up in the US-European tradition. Most of the evaluations of the ITE LS practices reported no funding source, which might also reflect their small scale.

ITE LS practice mainly involved schools and universities in some kind of collaboration. However, some LS were only university based and did not involve schools, and some were in schools-only based training schemes. The main type of ITE was the undergraduate type over several years rather than the postgraduate form of ITE (typically over one year). This

could reflect that it is easier to arrange LS in a longer course. ITE LS was also mostly in the field of mathematics teaching, which continues the historical tradition of LS in Japan. However, a range of other curriculum subjects were also represented.

The rationale for using LS in ITE was justified mainly in terms of developing a reflective approach to teaching, establishing collaborative professional development and developing critical skills. There were many specific reasons for using LS in ITE which reflected the flexibility of LS uses in ITE, from its use in micro-teaching to its research-based features in connecting curriculum/pedagogy to classroom teaching. These papers involved some evaluations of LS, though the type and rigour of evaluation varied considerably. Many were categorised as demonstrations of how LS could be used in ITE, with many using a case study type of design, often using qualitative data. Some used mixed data methods, though few involved quasi-experimental designs, and none randomised control trials. These designs also reflect the small scale of these ITE uses of LS.

The main findings from the analysis of these papers, which were summarised above, can be grouped into these broad themes: how LS was introduced into ITE, the particular procedures of LS used and the kinds of contribution LS made to teaching in ITE. The analysis of these studies also showed how LS helped the planning, teaching, reflecting on and reviewing of lessons, and so helped trainees link theory and practice. In some instances, LS was presented as a model of reflective practice with which teachers can engage, a way of enhancing specialised content knowledge, developing critical observation skills and becoming more aware of the complexity of teaching.

However, the review also showed recognition of some barriers in ITE LS use; for instance, a lack of time in what can be seen as demanding LS implementation requirements, training tutors who are sometimes uncomfortable with the type of relationships within LS groups and whether pre-service trainees can benefit from the reflection skills required in LS. This point relates to LS practice often being used by experienced teachers in continuing professional development (CPD) (Xu and Pedder 2015).

The results also reflect on the value of the seven-dimensional framework of LS variations (Norwich 2018) for this review of LS practices in ITE. The framework has been shown to be useful in identifying the specific details of LS practice and as illustrated in the two detailed examples of LS use. But this review also shows the areas of the framework which could be revised to be more specific. These were the dimensions about the *study methodology*, for instance, where reviewers found it hard to code some papers, partly because about half of the studies were unclear about this aspect. In the other papers, LS was presented as reflecting some form of action research, which is a common framing of LS methodology (Lewis 2009). In these studies LS involved both an inductive logic, drawing on implicit and craft teacher knowledge, as well as a deductive logic, starting and using some teaching or learning theory. These latter kinds of knowledge relate to the *knowledge base* of the LS, which is the third dimension in the framework; a mix of curriculum programme knowledge, subject pedagogic knowledge and to a lesser extent learning theory. Another area where the framework could be amended to be specified in more detail was the *relationships in the LS group*, also shown by coding being difficult. Here the framework needs to define what is meant by different options (expert–novice, facilitator–participant and parity–equality).

A central feature of LS design is its focus on student learning as the basis for planning and reviewing teaching (Lewis 2009). However, this review shows that although this was the focus of some of the included ITE LS papers, many more papers involved a focus on specific teacher actions or the whole teaching programme in a lesson. This might reflect a difference in the focus between ITE- and CPD-based LS. It could be understood in terms of the ITE use of LS being as much or more about trainee teacher learning as about the classroom students' learning. This interpretation is consistent with the results of the coding of the learner focus aspect in the LS procedures dimension. While most papers involved LSs where the learner focus was mainly on the whole class of students in the research lessons, rather than on specific students (case students), several papers were also coded as focused on trainee teachers.

As discussed above, the *relationships in the LS group* was a dimension where coding was difficult. Though this is partly about the need for clearer specification of the framework options, it was also where authors ignored describing this aspect of their LS procedures. This aspect is about whether the LS group had someone acting as a 'knowledgeable other' (Takahashi and McDougal 2016) and/or as a facilitator.

As expected, the LS procedures dimension showed much variation in these aspects: *number of research lessons; number of review and planning meetings; whether revised research lessons were retaught or not; the learner focus (as mentioned above); the duration of LS; the number and membership of the LS group; how learning resulting from the LS was assessed and how results were communicated to others.* As with the other dimensions, many papers did not specify all these aspects of LS practices.

Whether these procedural variations are all compatible with the practice being justifiably called 'lesson study' is an important question. It depends on what elements are taken to define LS. Some definitions take a minimal position (Norwich 2018; for example, collaborative design of lessons or units of study; execution of the design with observation and reflection on the product with a view to its improvement). Others adopt a broader set of elements (a clear research purpose, study of available curricula; written research proposal; live research lesson and discussion; knowledgeable others and sharing of results; Takahashi and McDougal 2016). These authors go further to distance their more specific formulation, by calling these practices 'collaborative lesson research' rather than 'lesson study'. But what is clear from the results of this review is that the minimal or broader positions can be accommodated within Norwich's (2018) framework. The US and Norwegian examples illustrated how this range of LS use in terms of LS purposes (bridge professional learning from campus to class teaching – enhance trainee teacher mentoring practices) and procedures (for instance, scale and duration of LS and membership of LS groups). Though these two examples are not typical of other reviewed LS practices, they are compatible with the minimal definition of LS above and would not count as 'collaborative learning research'. But they also illustrate the value of a broad concept of LS in terms of its flexibility. These examples also illustrate how the seven-dimensional framework of LS variations can structure a detailed and relevant account of the initial teacher education use of LS.

This review confirms and builds on da Ponte's (2017) key points from his review of LS use in preservice secondary mathematics programmes. He identified three broad issues: i. working relations in LS, ii. the scale of LS use, and iii. the adaptation–simplification of LS. This review found that there was some uncertainty about the nature of relationships within LS groups, which is linked to who is a member of the LS group, the role of tutors and school mentors as 'knowledgeable others' and/or facilitators of the process. The ITE use of LS in the reviewed papers were relatively small-scale, demonstration studies and so were probably peripheral to the courses rather than indicative of large-scale LS use in ITE programmes. The large-scale use of LS as central to ITE programmes would require significant tutor, school and school mentor preparation, a significant management task. Da Ponte's third area, the balance between LS adaptation and over-simplification, is also illustrated in this review. The review shows how LS was adapted to fit into existing ITE programmes, though most LS was not part of sustained LS practice. However, in these adaptations some LS practice only used one research lesson and had only two trainees in the LS group. This may be regarded as an over-simplification of LS, as it does not enable reflection on lesson processes and outcomes with a view to lesson improvement. This raises the important question of whether ITE courses also need to adapt to LS requirements rather than just the other way round.

Conclusion

In drawing conclusions about lesson study in initial teacher education, we recognise that our review was confined to ITE LS use as reported in academic journal papers in the English language. We expect that in journal papers in other languages and in non-academic sources there will also be specific descriptions of ITE LS use. So, there is scope for further research to examine these other sources of ITE LS practice.

Nevertheless, it is possible to frame LS, based on this review, as an example of teacher enquiry-based practice. This can be linked to building the capacity for a self-improving education system that involves a teaching profession informed by research. The British Education Research Association inquiry into the role of research in teacher education (BERA 2014) identified several ways; through research-based knowledge to inform the content of teacher education programmes; by informing the design and structure of teacher education programmes, so equipping teachers and teacher educators to engage with and be discerning users of research; and by equipping teachers and teacher educators to engage in enquiry-based practice. The latter involves preparing teachers to have the capacity, motivation and opportunity to use research-related skills to investigate what is working well and what is not effective in their own practice. This is where LS and LS-related practices can play a crucial role. It is notable that Darling-Hammond (2017), in a review of what can be learned from teacher education practices around the world, concluded that whether teachers can be motivated about their work 'depends on both ongoing high-quality learning opportunities and career opportunities that enable them to share their expertise in a variety of ways'. She identifies that 'job embedded forms of professional learning are taking greater root, often organised around teachers' work with curriculum development through collaborative planning, lesson study and action research of various kinds' page 14. This is the context of the significance of LS for ITE.

Note

1. For the list of papers used in the review, please see <https://drive.google.com/file/d/1kQEDmWOITS7FtqMKBm44om8ks5I4fXC1/view>

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Notes on contributors

Viv Baumfield is Professor of Professional Learning/Co-Director of the Centre for Research in Professional Learning at the Graduate School of Education, University of Exeter, UK.

Alison Bethel is an Information Specialist at the College of Medicine and Health, University of Exeter, UK.

Chris Boyle is Professor of Inclusive Education and Psychology at the University of Adelaide, Australia.

Will Katene is a Senior Lecturer in Physical Education/Subject Lead Secondary PGCE Physical Education at the Graduate School of Education, University of Exeter, UK.

Helen Knowler is a Lecturer in Education at the Graduate School of Education, University of Exeter, UK.

George Koutsouris is a Senior Lecturer in Education at the Graduate School of Education, University of Exeter, UK.

Brahm Norwich is Professor of Educational Psychology and Special Educational Needs at the Graduate School of Education, University of Exeter, UK.

ORCID

Viv Baumfield  <http://orcid.org/0000-0001-7193-8512>
 Alison Bethel  <http://orcid.org/0000-0002-0963-9201>
 Chris Boyle  <http://orcid.org/0000-0001-8880-6129>
 Will Katene  <http://orcid.org/0000-0002-7842-2428>
 Helen Knowler  <http://orcid.org/0000-0002-9538-2595>
 George Koutsouris  <http://orcid.org/0000-0003-3044-4027>
 Brahm Norwich  <http://orcid.org/0000-0002-1852-8829>

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