

Integrating Lesson Study into Pre-service Teacher Education: A Proposed Model of Learning to Teach in Real Context

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Abstract

In this paper, we argue that there are potential advantages of integrating Lesson Study in pre-service teacher education as compared to the conventional model of pre-service teacher education. The paper will first describe the two key features of Lesson Study and theorize how these features can help to enhance pre-service teachers' pedagogical and content knowledge, as evidenced in our earlier research studies that integrated lesson study into pre-service teacher education during their teaching method courses. This paper ends with a proposed model of integrating Lesson Study into pre-service teacher education, particularly during teaching practices.

Keywords: Lesson Study; pre-service teacher education; learning to teach

Abstrak

Dalam kertas ini, kami berpendapat bahawa terdapat potensi kebaikan mengintegrasikan *Lesson Study* dalam pendidikan guru pra-perkhidmatan berbanding model konvensional. Kertas ini akan menerangkan kedua-dua ciri-ciri utama *Lesson Study* dan berteori bagaimana ciri-ciri ini boleh membantu untuk meningkatkan pedagogi dan pengetahuan kandungan guru pra-perkhidmatan, seperti yang dibuktikan dalam kajian penyelidikan awal yang mengintegrasikan *Lesson Study* ke dalam pendidikan guru pra-perkhidmatan semasa pelaksanaan kursus Kaedah Mengajar. Kertas kerja ini mencadangkan model pengintegrasian *Lesson Study* ke dalam pendidikan guru pra-perkhidmatan, terutamanya dalam amalan pengajaran.

Kata kunci: Lesson Study; guru pra-perkhidmatan pendidikan; belajar untuk mengajar

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1.0 INTRODUCTION

Teaching is a craft that every teacher needs to acquire. As any craft, learning to teach takes time and experience to grow and flourish, as one learns cumulatively from previous successes and failures. Pre-service teachers usually start learning to teach students during their teaching practice. In most pre-service teacher education programs, the conventional model of teaching practice involve sending trainee teachers to schools for a period ranging from 6 weeks to 15 weeks to practise what they have learnt in campus, under the supervision of supervisors and/or mentors. During teaching practice session, teacher trainees are expected to plan their daily lessons individually and their teaching are observed occasionally by their supervisors and mostly by their mentor teachers in schools, who will guide and evaluate their performance. This conventional model of teaching practice can be effective with the presence of quality interaction or communication between the mentor teachers and the individual student teachers. However, some studies show limitations of relying on mentor teachers on several grounds, such as mentors incline to promote conventional norms and practices, thus limiting reform (e.g., Feiman-Nemser, Parker, & Zeichner, 1993 in Feiman-Nemser, 1996). Besides, mentor teachers lack mentoring experience in observing and discussing teaching with colleagues as most of the time they work alone in the privacy of their classroom protected by norms of autonomy and noninterference (Feiman-Nemser, 1996). Apart from that, few mentor teachers use conceptually oriented and student-centred approach to teaching as advocated by education reformers (Cohen, McLaughlin, & Talbert, 1993 in Feiman-Nemser, 1996). "If we want mentors to help novices learn the ways of thinking and acting associated with new kinds of teaching, then we have to place them with mentors who are already reformers in their schools and classrooms (Cochran-Smith, 1991), or develop collaborative contexts where mentors and novices can explore new approaches together" (Feiman-Nemser, 1996, p. 1). "The persistence of privacy, the lack of opportunities to observe and discuss each other's practice, and the tendency to treat all teachers as equal limits what mentors can do, even when working with novices (Little, 1990)" (Feiman-Nemser, 1996, p. 1).

■2.0 WHAT IS LESSON STUDY

A review of the literature shows that Lesson Study has been practised at least 40 years ago in Japan. But it was only in the late nineties that there was a sudden spur of interest among people of other nations. Perhaps, the spur of interest about lesson study could be related to the publication of the book entitled, *The Teaching Gap* by Stigler and Hiebert (1999). Their book reported the analysis of the Third International Mathematics and Science Study (TIMSS) video study. Compared to the instructions in Germany and United States, the Japanese lessons were highly rated in three aspects: (i) mathematics content, (ii) coherence and connections of contents, and (iii) students' thinking and reflection in the lessons. In particular, Stigler and Hiebert highlighted that the practice of lesson study could have contributed much to the high standard of mathematics teaching and achievement in Japan.

A further review of literature related to effective professional development (examples, Guskey, 1997; Hawley & Valli, 1999; Elmore, 2002) show that there are five agreed principles of effective professional development, which include:

- i. focus on students learning and outcome;
- ii. providing opportunities for teachers to develop knowledge and based on collaborative problem solving;
- iii. school-based; and
- iv. on-going and be given continuous support.

Compared to what have been summarised by Stigler and Hiebert (1999) that the four main features of lesson study are: Lesson study is based on a long-term continuous improvement model;

Lesson study maintains a constant focus on student learning;
Lesson study focuses on direct improvement of teaching in context; and
Lesson study is collaborative (pp. 120-127)

Obviously, we noticed that these features are consistent to the five principles of effective professional development as discussed above.

Moreover, the two key features of Japanese model of Lesson Study are peer collaboration and self reflection. More specifically, a Lesson Study cycle composes of setting a common goal, collaboratively planning a lesson, observe and reflect on the lesson taught by one of the Lesson Study members, revise and re-teach the lesson if necessary. When planning the lesson, besides choosing the best strategy or approach, the main focus of the planning will be thinking on students' expected answers or reactions to the potential questions asked by the teacher. Every example given or question asked has to be deeply thought and carefully crafted by the Lesson Study team.

■3.0 EXPERIENCES LEARNT FROM PAST STUDIES ON INTEGRATING LS IN PRE-SERVICE TEACHER EDUCATION

Since 2003, a team of researchers from the School of Educational Studies, Universiti Sains Malaysia has been exploring the effects of integrating Lesson Study into the pre-service teacher education, particularly for the pre-service mathematics education programme. For instance, Chiew and Lim (2003) piloted Lesson Study on five pre-service mathematics teachers who were doing their teaching practice in a secondary school in Kedah. The exploratory study was conducted over a period of five weeks (the 4th till 8th week of the teaching practice). Only one full cycle of Lesson Study was completed. Qualitative data were collected through classroom observation, interviews, individual reflection and journal writing. Analysis of the data showed that Lesson Study helped to improve the pre-service mathematics teachers' content and pedagogical content knowledge through the process of discussions and self-reflections as claimed by the participants. Besides that, they also gained much more self confidence through the supporting environment provided by their peers.

Encouraged by the positive feedback, Lim (2006) expanded the concept of Lesson Study to her 83 pre-service mathematics teachers in January 2006. The Lesson Study process was integrated into the mathematics teaching method course as part of student project work. First, the concepts and procedures of doing Lesson Study were introduced in a two-hour lecture. The lecture was illustrated by a 20-min video tape entitled *Lesson Study: An Introduction* produced by Yoshida and Fernandez (2002). After the lecture, the participants were divided into four tutorial groups. Each tutorial group had approximately 24 pre-service mathematics teachers. Each group met at a specific tutorial time every week. During the first tutorial, every four pre-service mathematics teachers were assigned randomly as a Lesson Study team. Each team began their first discussion by setting the goals and arranging a schedule for the following meetings. Their goals were mainly selecting a unit for a secondary mathematics lesson and determining the objectives to be achieved in a 40-min lesson. In the subsequent meetings, the teams discussed and planned collaboratively a draft lesson plan. During the third tutorial, each team was asked to present their draft lesson plan which was then commented upon by their peers and the lecturer (the researcher). Based on the comments and suggestions, they revised their draft lesson plans. Two participants from each team would then teach the lesson in the micro-laboratory. The teaching was video-recorded and observed by their team members. Based on the video recorded, each team reflected and revised further their lesson plan. The revised version of the lesson plan was then taught by the other two members in each team and was also video-recorded. Similarly, the video-recorded lesson was observed, reflected upon and further revised if deemed necessary. Each team was allowed to repeat the process of planning-teaching-observing-reflecting-revising as many times as they wished until they were satisfied with the planned lesson. At the end of the program, each team presented their recorded video lessons to all their peers in each tutorial group. The lessons were evaluated by both the lecturer (the researcher) and their peer group members. Taking these comments and the evaluation feedback, each team revised further their lesson plans. Altogether there were 21 lesson plans produced by the four tutorial groups. The final version of these lesson plans were then compiled and distributed to all the participants as a product of their collaboration. As reported by Lim (2006), analysis of the questionnaire data indicated that 98% of the pre-service teachers agreed that the Lesson Study process has improved their content knowledge and skills in planning a lesson and 95% reported they had gained new teaching ideas from

the program. While 90% of the pre-service teachers complained that the program took up a lot of their time, they agreed it was still a worthwhile endeavor. One of the reasons could be Lesson Study has made them more reflective about their own teaching (90.4%), more confident to teach the topic (85.6%) and has strengthened peer relationships (89.1%). In sum, the majority of the participants perceived that the program could promote peer collaboration, gain new teaching ideas and improve their teaching skills. Hence, the lesson study project was extended to involve pre-service mathematics and chemistry teachers for the 2007 and 2008 cohorts. For the following 2009, 2010 and 2011 cohorts of pre-service mathematics teachers, the Lesson Study project continued but with a slight change in focus as reported in Chew and Lim (2011a, 2011b) and Chew, Lim, Wun and Lim (2012).

In Chew and Lim (2011a), 27 Lesson study groups that consisted of 4-5 pre-service secondary mathematics who were attending a mathematics teaching method course were set up. Following the Lesson Study process as described earlier in Lim (2006), each group collaboratively planned out a lesson, but this time, the goal of the lesson was to promote mathematical thinking and communication. Analysis of the three written lesson plans of Groups A and B indicated that these pre-service teachers showed gradual and positive changes in their mathematical thinking and communication after the Lesson Study collaboration. For example, as evidenced in the first lesson of Group B the team attempted to use a deductive thinking process to teach the concept of a tangent to a circle by providing the definition, diagram and symbols. However, their teaching approach was too teacher-centered and the pupils were not encouraged to explain their mathematical thinking in any form. After reflection and revision, the second lesson showed that the team began with an inductive thinking process to teach the concept of a tangent to a circle by asking three different types of questions. Nevertheless, the first two questions were of low order thinking skill (such as “Is this a tangent to the circle?” which failed to promote pupils to think and explain mathematically. In their final lesson plan, the participants still employed an inductive thinking process to teach the concept of a tangent to a circle. But this time, they provided appropriate examples and non-examples of a tangent to a circle. Then, the students were asked to identify the tangent to a circle and explain their answers based on the given examples and non-examples of the concept. Thus, the participants managed to communicate their mathematical thinking coherently and clearly to the students. As a result, the pupils were able to understand the concept of a tangent a circle clearly.

Subsequently, Chew and Lim (2011b) promoted the use of Geometer’s Sketchpad (GSP) software among pre-service mathematics teachers through Lesson Study. GSP is a dynamic geometry software program for constructing and investigating mathematical objects that enhances the teaching and learning of geometry and many other areas of mathematics. 24 Lesson Study groups, each comprising four or five pre-service secondary mathematics teachers who attended a mathematics teaching methods course were set up in four tutorial groups. There were six Lesson Study groups in each tutorial group. Besides introducing the concepts and procedures of Lesson Study process, these students were also given two workshops on GSP. Each group then planned out the lesson collaboratively following the Lesson Study process as described earlier by Lim (2006). Analysis of their GSP sketches in the first, second and third lessons indicates that the participants of this Lesson Study group showed significant changes in their skills of using GSP to teach the topic.

Following this, Chew, Lim, Wun and Lim (2012) aimed to determine the effect of Lesson Study (LS) on pre-service secondary teachers’ technological pedagogical content knowledge (TPACK) for teaching mathematics with The Geometer’s Sketchpad (GSP). The researchers employed a single-group pretest-posttest design to examine whether there was a significant difference in the pre-service secondary teachers’ TPACK for teaching mathematics with GSP after engaging in LS which was incorporated into the mathematics teaching methods course during the first semester of the 2011/2012 academic session in a public university. Forty-six pre-service secondary teachers who enrolled in the course completed the Survey of Pre-service Secondary Teachers’ TPACK for Teaching Mathematics with GSP before and after engaging in LS. The results of the paired-samples t-test showed that there was a significant difference in the pre-service secondary teachers’ TPACK for teaching mathematics with GSP after engaging in LS at the significance level of .05. However, the results of the independent-samples t-test showed there were no statistically significant differences in the TPACK for teaching mathematics with GSP between male and female pre-service secondary teachers before and after engaging in LS at the significance level of .05.

■4.0 A PROPOSED MODEL OF INTEGRATING LS IN TEACHING PRACTICE

In view of the potential advantages that can bring to the future novice teachers, we would like to propose a possible model of integrating Lesson Study into the teaching practice which is as follows (see summary in Figure 1).

Set up a Lesson Study group that consists of two student teachers and their two mentors (*guru pembimbing*). The ideal size of a Lesson Study group will be 4-6 members only. This group size is important so that there will be sufficient exchange of ideas and inputs from the members, while allowing convenience or ease to arrange for meetings.

Carry out at least two Lesson Study cycles that consist of the following steps:

- a) Identify a common goal. More specifically, identify a topic/unit/concept/lesson that teachers or students have difficulty in teaching or learning. In a more practical sense, the lesson to be taught should be identified one month earlier so as to allow sufficient time for planning and discussion.
- b) The student teachers will plan collaboratively the lesson; refine the lesson with advices from their mentor teachers through a number of discussions until all the group members are satisfied with the planned lesson.
- c) Then one of the student teachers will teach the lesson, while other members of the LS group (including the two mentors and the university supervisor) will observe the lesson taught in real classroom context. To gain more input, the group can also invite or open the lesson to other teachers from the same school to observe together.
- d) Immediately after the lesson observation there will be the post-lesson reflection. During the post conference reflection, the teacher who taught the lesson will first reflect on the lesson, followed by reflection from other members of the group. The focus of the reflection should be on the lesson and the learning of the students, not on the teacher who taught that lesson. It is important to emphasize that the main aim of the observation is for learning and not for evaluation; hence the comments and suggestions should be focused on enhancing the lesson and not evaluating the teaching of the teacher.

- e) After the reflection session, the student teachers can then collaboratively revise the lesson plan based on the comments and suggestions given. This could take another two to three discussion sessions if necessary.
- f) Then the next cycle, another student teacher in the group will re-teach based on the revised lesson plan to another class; observed by other members of the Lesson Study group; reflect and revise the lesson plan again if necessary.

The whole lesson study project normally takes one to two months to complete. Therefore, we can expect to have at least two lesson study cycles during one teaching practice of 15 weeks.

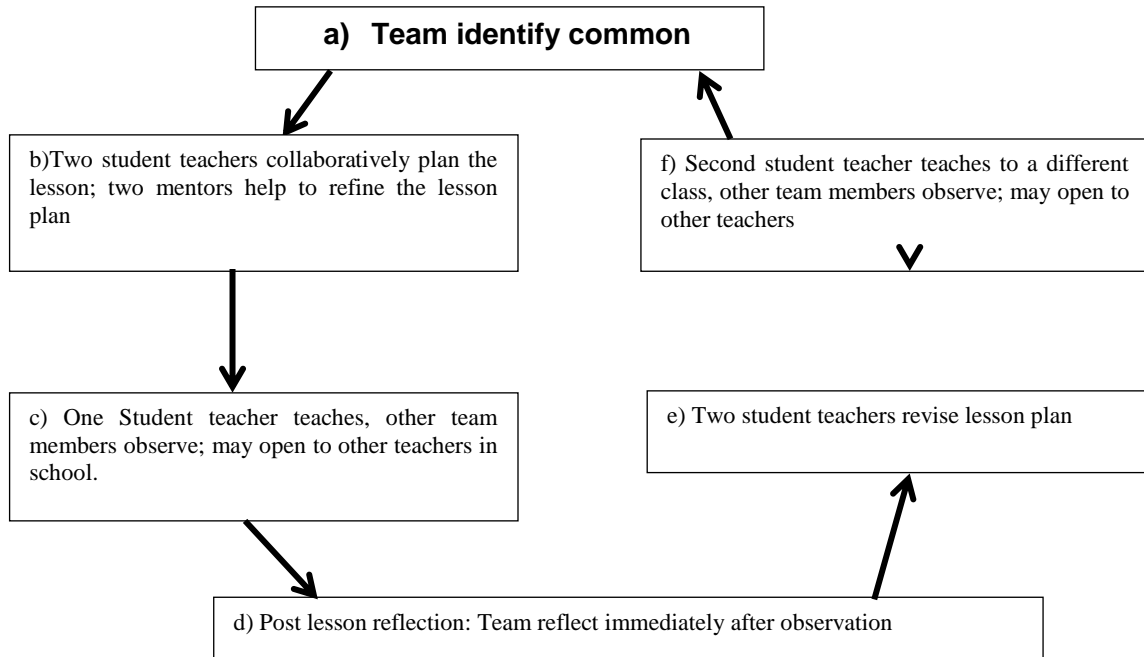


Figure 1 A proposed model of lesson study

■5.0 KEY BENEFITS OF INTEGRATING LS INTO PRE-SERVICE TEACHER EDUCATION

We contend that there are several key benefits of integrating Lesson Study into the pre-service teacher education programme.

5.1 Ideal For Novice or Beginning Teachers: Sharing of Teaching Experiences and Ideas From Senior Teachers.

One of the main aims of teaching practice is to provide the opportunity for student teachers to practise what they have learnt in higher education institution into real school context. However, without much teaching experience, most novice teachers may face the problem of deciding how and what to be included in a planned lesson. Certain teaching strategies might be good in theory, but in practice they might need to be modified or adapt to cater for the different needs and abilities of pupils. Normally, during teaching practice a one-to-one and top-down supervision practice include a supervisor or mentor teacher checking lesson plan prepared by an individual student teacher, then observing the student teaching in class followed by discussion with the student teacher about their teaching performance against the prepared lesson plan. We argue that through Lesson Study cycles, with a supervisor/mentor-student teacher collaboration which is more structured, involving sharing of teaching experiences from the senior teachers as mentor teachers or *guru pembimbing*, these young teachers will be able to gain practical tips and strategies in handling the pupils, managing the class and choosing the right strategies for the right group of pupils.

5.2 Put Theories into Practice—Studying Teaching in Real Context.

In Lesson Study programme, the student teachers stand a better chance to learn from teaching the lessons to the real students in the real classroom context. During teaching practice, they are able to test the ways of teaching certain topics to students of diverse backgrounds which form the real context of classroom teaching. Students' ways of knowing the subject matter will emerge during teaching will inform student teachers that there are multiple ways of explaining a topic to different students. By studying the lessons being taught with the external help of other student teachers, the classroom contexts will become the testing ground for the theoretical knowledge and skills prescribed to the student teachers.

5.3 Lesson Study Focuses on Students' Expected Answers: Think and Plan Deeply Into Content, Not Just Pedagogy.

Lesson Study emphasizes on focusing on student thinking and student learning. During the lesson planning stage, each team of teachers focuses on the needs of their own local students. The team members could see and discuss the live instruction that was designed and enacted, focussing on what and how students are learning the content. For example, they will deliberate on why a student understands the content differently, based on the lesson observed, which was not noticed by the teacher in-charge. Under Lesson Study, group members will focus on how different students react to the same topic taught by the teacher, and later share the multiple ways of knowing and understanding of the topic demonstrated by students in class.

5.4 Benefits to Senior Teachers—Sharing and Gaining of New and Creative Ideas from the Juniors.

Learning is a never ending process and Lesson Study does not only benefits student teachers. For the junior teachers who were lacking in teaching experiences, they could be more receptive and more responsive to new ideas through Lesson Study collaboration with senior teachers. But for the senior teachers, they can also gain new and innovative ideas from sharing with the juniors. Through discussing the concepts or content with the juniors, this can also enhance the content knowledge and pedagogical content knowledge for the seniors.

5.5 Build Up Collaborative and Reflective Culture among Teachers.

Lesson study, if become a continuous practice in school would be able to promote collaboration among teachers. Once graduated, pre-service teachers informed with Lesson Study skills should continue to collaborative work with colleagues to develop lessons that will match student different needs, abilities and ways of knowing the subject matter being taught. The knowledge and skills of teaching different specific topics and student characteristics can be shared with other teachers, allowing teachers to learn from one another. In addition, as Lesson Study also promote reflective practices. If pre-service teachers continue to practice Lesson Study, a reflective culture among teacher can develop in schools which will help teachers to improve their teachers throughout their career.

6.0 CONCLUSION

The findings from our earlier research studies indicated that the integration of Lesson Study into pre-service teacher education during their mathematics teaching method courses could help to enhance pre-service teachers' pedagogical and content knowledge (Chiew & Lim, 2003), mathematical thinking and communication (Chew & Lim, 2011a), skills of using GSP to teach mathematics (Chew & Lim, 2011b) as well as technological pedagogical content knowledge for teaching mathematics with GSP (Chew, Lim, Wun & Lim, 2012). In addition, we maintain that there are potential advantages of integrating Lesson Study into pre-service teacher education as compared to the existing practices in conventional model of pre-service teacher education. This is because Lesson Study: (i) is ideal for novice or beginning teachers; (ii) puts theories into practice; (iii) focuses on student thinking and student learning; (iv) benefits senior teachers by allowing them to gain new and creative ideas from beginning teachers; and (v) builds up collaborative and reflective culture among teachers.

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