LESSON STUDY – HOW IT COULD WORK FOR YOU

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There is growing worldwide interest in Japanese Lesson Study as a form of professional development, with adaptations of Lesson Study taking place in hundreds of school clusters in the USA, large-scale adoption in the UK, and smaller scale implementation in Australia, and many other countries. This paper describes the typical Japanese structured-problem-solving research lessons that form the basis for Lesson Study, and discusses how they are planned, the role of the teacher, and the use of Lesson Study as a means of professional development.

Introduction

Japanese Lesson Study first came to world-wide attention through Makoto Yoshida's doctoral dissertation (Yoshida, 1999; Fernandez & Yoshida, 2004) and Stigler and Hiebert's (1999) accounts of Lesson Study based on the Third International Mathematics and Science Study (TIMSS). By 2004, Lesson Study was taking place in the USA in at least 32 states and 150 lesson study clusters.

In the United Kingdom there has been growing interest in, and government support for, Lesson Study as a powerful form of professional development (see, for example, Department for Children, Schools and Families, 2008).

Adaptations of Japanese Lesson Study are being implemented, often in small ways, in many other countries, including Chile, Indonesia, Malaysia, Mexico, Peru, Philippines, Singapore, Thailand, and Vietnam (APEC-HRD Lesson Study Project, n.d.).
In Australia, there have been a number of small-scale attempts at Lesson Study (see, for example, Hollingsworth & Oliver, 2005; Clarke & Sanders, 2009; Pierce & Stacey, 2009) as well as a larger-scale trial of a modified form of Lesson Study in NSW (see, for example, White & Lim, 2008). However, as Stephens (in APEC-HRD Lesson Study Project, n.d.) points out, “schools need assistance to engage more deeply in the research phase, and to see Lesson Study as part of an ongoing cycle of improvement”.

The purpose of this paper is to describe the typical Japanese structured-problem-solving research lessons that form the basis for Lesson Study, discuss how they are planned, the role of the teacher, and the use of Lesson Study as a means of professional development, with a view to widening its implementation in Australia.

**What is Japanese Lesson Study?**

Japanese Lesson Study is a voluntary professional learning activity whose origins can be traced back for almost a century. Lesson Study occurs across many curriculum areas, in the vast majority of elementary schools, and to a lesser extent in junior secondary schools and much more rarely in high schools.

Lewis (2002) describes the *Lesson Study Cycle* as having four phases:

1. goal-setting and planning – including the development of the Lesson Plan;
2. teaching the “research lesson” – enabling the lesson observation;
3. the post-lesson discussion; and
4. the resulting consolidation of learning, which, according to Lewis and Tsuchida (1998) has many far-reaching consequences.

Lesson Study occurs in a variety of settings. Probably the most popular form of Lesson Study occurs within a single school, over a period of one or more years. Schools will decide on a goal and a curriculum area on which to focus. This goal-setting and planning phase begins with looking at broad goals, rather than fostering specific academic skills. For example, among sample goals given by Fernandez and Yoshida (2004) are the following: “Using a Japanese language class to foster students’ ability to wrestle with topics they discover on their own” and “Developing well-thought-out mathematics lessons that provide students a feeling of satisfaction and enjoyment of mathematical activities, while fostering their ability to have good foresight and logical thinking” (p. 12).
Working in small groups over a year, teachers from different year levels might undertake three or four Lesson Study Cycles in which they plan a research lesson. One member of the group teaches the lesson, which is observed by teachers from the whole school, as well as possibly parents and outside observers, together with an outside adviser, who sometimes would have been involved to a minor extent in the early stages of the planning as well. Outside advisers might be university-based experts, regional instructional superintendents who specialize in the chosen curriculum area, or experienced teachers released for a year to provide staff development. However, in most primary schools there would also be an internal "expert" in the area – a teacher whose university major in their teaching degree was in that curriculum area.

Each such research lesson is followed by a post-lesson discussion, during which the teacher and all observers publicly reflect on the lesson and offer suggestions for how it could be improved. These reactions are based on detailed observations of the students' and the teacher's actions during the lesson. In some cases, the lesson might be revised and taught to another class, but this is not an essential part of the Lesson Study Cycle.

This pattern, which is typical of what happens in so-called "local" schools, is often extended in the more prestigious National Schools or schools attached to nearby universities. These schools may hold "open days" where teachers come from nearby schools or even from other cities across the country. Sometimes, as was experienced by one of the authors at a junior secondary school attached to a university, the open day involved research lessons being conducted simultaneously across a wide range of curriculum areas.

Other venues for Lesson Study observed include a Saturday Lesson Study "conference" at an open-plan primary school, where about 1000 participants observed and reflected on three sets of five parallel lessons in mathematics – a strenuous experience involving a lot of standing in extremely hot, hugely overcrowded conditions! In this case, the lessons were taught to children who were not known to the teachers. The teachers were either well-known "veteran" teachers, often experimenting with new ways to reach particular groups and looking for suggestions from the observers, or teachers wanting to disseminate their own innovative ways of teaching to a wider audience.

In Japan, the process of Lesson Study is regarded as making participants and observers think quite profoundly about specific and general aspects of teaching. It is a long-term activity, not just about improving a single lesson, but rather about professional learning through participation in the whole process.
The Japanese Structured Problem-Solving Lesson

In mathematics, the research lesson, at least at the primary school level, usually follows the typical lesson pattern for a Japanese “structured problem-solving lesson”.

According to Stigler and Hiebert (1999, pp. 79-80), such lessons can be described as having the following stages:

- Reviewing the previous lesson
- Presenting the problems for the day
- Students working individually or in groups
- Discussing solution methods
- Highlighting and summarizing the main point.

Major characteristics of such lessons include:

- the hatsumon – the thought-provoking question or problem that students engage with and that is the key to students' mathematical development and mathematical connections;
- kikan-shido – sometimes referred to as the “purposeful scanning” that takes place while students are working individually or in groups, which allows teachers not only to monitor students’ strategies but also to orchestrate their reports on their solutions in the neritage phase of the lesson;
- neritage – the “kneading” stage of a lesson that allows students to compare, polish and refine solutions through the teacher’s orchestration and probing of student solutions; and
- matome — the summing up and careful review of students’ discussion in order to guide them to higher levels of mathematical sophistication (see, for example, Shimizu, 1999).

A Research Lesson in Grade 3

While research lessons are usually planned to take 45 minutes, many such lessons continue for longer. The breakdown of time for the different stages of such a lesson often comes as a great surprise for Western observers. For example, in one Grade 3 lesson observed, there was no review of the previous lesson, 45 minutes were spent discussing solution methods, and 5 minutes were spent on each of the other stages.
The problem presented was:

*There are 35 pieces of cookies and 7 people. If each person gets the same number, how many pieces does each person get?*

How can such a prosaic problem lead to 45 minutes of discussion of solutions?

Firstly, students are accustomed to providing a wide range of solutions to problems and participating in extended discussions of their strategies. They understand that their solutions are listened to by the teacher and the other students and that they form an important vehicle for the learning that takes place in the class.

Secondly, there is much greater use of diagrams and drawings of solutions than is common in Western countries. A few examples of children's solutions are shown below (Figures 1 to 4).

![Figure 1. A solution for the cookies problem](image1)

![Figure 2. A different solution for the cookies problem](image2)

![Figure 3. A child's solution, notes and summary of the lesson](image3)

![Figure 4. Another child's solution, notes and summary of the lesson](image4)
Another really important point is that the hadsumon – the thought-provoking question or problem – is not really how many cookies each person gets, but the different ways that a solution can be found for this problem. Children not only know the answer to $35 \div 7$, but they understand that the lesson is leading to something much more important than finding this answer – in this case the lesson was an introduction to partition or “sharing” division with the aim of showing how multiplication can be related to such division problems.

While the children are working individually, the teacher is “purposefully scanning” their solutions – kikan-shido – in order to select children and decide the order in which they will come to the front to share their solutions.

As different children share solutions in the neriage stage of the lesson, the others make their own notes, as can be seen in the top right hand corners of children's sheets of paper in Figures 3 and 4.

At the end of the lesson, after the teacher has summed up the lesson and carefully commented on children’s solutions – the matome — children write their own summary in the bottom right hand boxes on their sheets of paper (see Figures 3 and 4).

The Role of the Teacher

Doig, Groves and Fujii (submitted) identify four types of tasks typically used in Japanese Lesson Study research lessons – tasks that:

- directly address a concept;
- develop mathematical processes;
- have been chosen based on a rigorous examination of scope and sequence; and
- address known misconceptions.

In Japanese research lessons, the process of selecting the problem or task for the problem-solving activity comes about through kyozaikenkyu, which is the investigation of a large range of instructional materials, including textbooks, curriculum materials, lesson plans and reports from other lesson studies, as well as a study of students' prior understandings “which makes it possible for teachers to be able to anticipate students' reactions and solutions to the problems students study during lessons” (Research for Better Schools, n.d.). While all teachers need to engage in kyozaikenkyu as part of their lesson planning, Lesson Study requires teachers to engage in it in much more depth.
Watanabe, Takahashi and Yoshida (2008), remind us that the purpose of Lesson Study is not just to improve a single lesson, but to improve mathematical instruction in general, which involves careful attention to kyozaikenkyu, something that is not always attended to in non-Japanese Lesson Study. While the literal meaning of kyozaikenkyu is the study or investigation (kenkyu) of instructional materials (kyoza), the word kyoza means much more than textbooks or curriculum materials and needs to involve learning goals. According to Watanabe, Takahashi and Yoshida (2008)

It is important that kyoza and subject matter content (specific knowledge and procedures to be learned through lessons) are distinguished. It is possible to explore the same subject matter with different kyoza, or we can investigate different subject matter with the same kyoza. (p. 19, translation cited in Watanabe, Takahashi and Yoshida, 2008)

Furthermore, according to Watanabe, Takahashi and Yoshida (2008), “Kyozaikenkyu, is the process to help teachers gain a deeper understanding of kyoza”. It is

the entire process of research activities related to kyoza, beginning with the selection/development, deepening the understanding of the true nature of a particular kyoza, planning a lesson with a particular kyoza that matches the current state of the students, culminating in the development of an instructional plan. (Yokosuka, 1990, p. 73, translation cited in Watanabe, Takahashi and Yoshida, 2008)

Thus it is very important that teachers have a knowledge of a range of tasks and the possibilities the tasks offer to meet their goals.

Lesson Study and Professional Learning

Lesson Study is much more than just planning together and observing one another’s lessons. The post-lesson discussion, which typically takes about one hour and starts with reflections by the teacher who taught the lesson, followed by questions and comments from all observers, and ends with comments from the outside reactor(s), is a critical part of the process.

Isoda, Stephens, Ohara, and Miyakawa (2007, p. xvii) identify three key ideas underpinning Japanese Lesson Study:

- the idea that teachers can best learn from and improve their practice by seeing other teachers teach:
Lesson Study – How it Could Work for You

- the expectation that experts in pedagogy should be encouraged to share their knowledge and experience; and
- a focus on cultivating students’ interest and on the quality of their learning.

While Lesson Study is not a compulsory feature in Japanese schools, it is clearly supported within schools and by the school system, with all teachers being expected to take part in professional learning and make efforts to improve their lessons. The fact that teachers must remain at school until 5 pm, even though students leave school much earlier, enables time to be set aside for Lesson Study activities. Moreover, it is possible in Japan to hold Lesson Study during the last period of the day in one class while sending the other children home, so that all teachers at the school are able to observe the lesson and take part in the post-lesson discussion. Publishers also play an important part by publishing teachers’ lessons that have been developed through Lesson Study. In addition, journals such as the *Journal of Japan Society of Mathematical Education* regularly devote a section to Study on Teaching Materials. The clear involvement of university-based and other outsiders is also seen as not only a supporting mechanism for Lesson Study, but also as a way of breaking the isolation experienced by some school teachers.

**How Lesson Study Could Work for You**

Lesson Study requires a commitment of time and resources from groups of teachers from within a school or across schools interested in improving students’ learning. While first-hand experience of Lesson Study in the Japanese context or involvement of Japanese participants has often been found to be a key factor in the success of Lesson Study in the USA and elsewhere, there are now many online and other resources available to help potential participants understand the process. The involvement of an appropriate adviser is also critical to the success of Lesson Study. Arguably, however, one of the major resources needed is time release to observe research lessons and to take part in the post-lesson discussion.

If you or your school is interested in taking part in Lesson Study, please email us at susie.groves@deakin.edu.au or badoig@deakin.edu.au
References


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