IMPLEMENTING JAPANESE LESSON STUDY IN THE AUSTRALIAN CONTEXT

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Extended abstract

This paper reports on a small-scale research project, *Implementing structured problem-solving mathematics lessons through Lesson Study,* carried out in three schools in Melbourne, Australia in 2012, with the aim of investigating the potential of Japanese Lesson Study for mathematics professional learning in the Australian context.

Japanese Lesson Study first came to world-wide attention as a vehicle for professional learning through Yoshida's (1999) doctoral dissertation and Stigler & Hiebert's (1999) accounts of Japanese structured problem-solving lessons based on the *Third International Mathematics and Science Study* (TIMSS) video study. Since then, there has been phenomenal growth of lesson study as a vehicle for professional learning. By 2004, adaptations of lesson study were taking place in over 335 schools across 32 states in USA (Lewis, Perry & Murata 2006), with more recent large-scale adoption in the UK (e.g. Department for Children, Schools and Families 2008), as well as implementation in South-East Asia (e.g. Indonesia, Malaysia), South America, many African countries (APEC-HRD Lesson Study Project n.d.), and Australia (e.g. Hollingsworth & Oliver 2005).

In Japan, the *research lesson* in mathematics, which underpins lesson study, is based on "structured problem solving", a major instructional approach designed to create interest in mathematics and stimulate creative mathematical activity (Takahashi 2006). Major characteristics of these structured problem-solving lessons include: a single, thought-provoking problem that students engage with; teachers' *purposeful scanning* while students work individually or in groups, which allows teachers not only to monitor students' strategies but also to orchestrate their reports on their solutions; students sharing of solutions to compare, polish and refine these through the teacher's orchestration and probing of student solutions, with this phase usually forming the major part of the lesson; and the teacher's summing up and careful review of students' discussion in order to guide them to higher levels of mathematical sophistication (Shimizu 1999).

However, as Stigler & Hiebert (1999) point out, efforts at improving teaching often ignore the fact that teaching is a cultural activity, which implies gradual change and the need to take into account the cultural assumptions underpinning teaching and learning. Moreover, prior research suggests that teachers often focus only on superficial aspects of lesson study (e.g. Robinson 2007; Perry & Lewis 2008; Inoue

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2011). Thus questions about the extent to which lesson study can be replicated elsewhere remain (Perry & Lewis 2008; Lewis, Perry & Hurd 2009), as do questions about the extent to which teachers can adopt structured problem-solving as the basis for research lessons.

The *Implementing structured problem-solving mathematics lessons through Lesson Study* project worked with two Years 3 and 4 teachers from each of three schools from a Melbourne school network to explore ways in which key elements of Japanese Lesson Study could be embedded into Australian mathematics teaching and professional learning. Teachers were supported not only by members of the research team, but also by a key leading teacher at each school (e.g. a curriculum specialist or numeracy coach) as well as the network numeracy coach, Kathryn Palmer, who played an important role in the project – a total of ten participants.

Participating teachers took part in an initial whole-day professional learning session on Lesson Study in July, and participated in one Lesson Study cycle during each of Terms 3 and 4 of 2012. Each Lesson Study cycle involved two cross-school teams of teachers planning a *research lesson* on the same topic, one member of each team teaching the lesson in front of observers, and both teams participating in the post-lesson discussions.

Here is a picture made up of some matchsticks.
How many matchsticks are there altogether?
How can you show your thinking using the diagram?

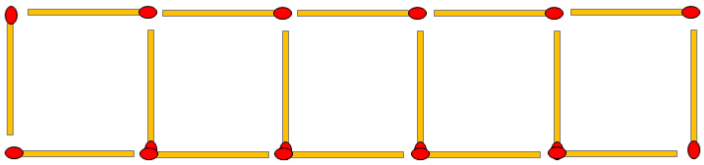

Figure 1. The Matchstick Problem as presented in the Year 4 research lesson

The first research lesson focussed on the *Matchstick problem* (see Figure 1). This problem was chosen for a number of reasons, including: the wide range of possible solutions; the fact that it could be tackled by both Year 3 and 4 students, with the problem lending itself to what in Japan would be called a "jump-in lesson", indicating that it could take place at many different points in the curriculum sequence; the focus on algebraic thinking – an area of mathematics that has not been emphasised in primary school mathematics prior to the recent introduction of the Australian Curriculum in Mathematics; and the opportunities for provoking students to justify their thinking and connect the patterns they found to the original situation.

Public observation and debriefing of research lessons is a feature of Japanese Lesson Study, so key staff at each school, together with all interested teachers who could be released from their classes at the time of the research lessons, were invited to observe the lesson and take part in the post-lesson discussions. The school and the research

team also invited other professionals such as teachers and mathematics educators to observe the research lessons and take part in the post-lesson discussions.

The planning sessions, research lessons and subsequent post-lesson discussions were all video recorded. Three audio-recorded interviews were also carried out with each of the participating classroom and leading teachers, as well as the network numeracy coach, who also took part in all of the activities.

This paper reports on the affordances that contributed to teachers' professional learning as a result of their participation in this project, as well as the constraints encountered and the implications of these for the sustainability of lesson study in the Australian context. While the focus of the project was on the implementation of Japanese Lesson Study in the Australian context, the findings have implications for its implementation in other countries, such as South Africa.

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