LESSON STUDY: A PROFESSIONAL LEARNING MODEL THAT ACTUALLY MAKES A DIFFERENCE

Hilary Hollingsworth
Education Consultant

Delwyn Oliver
Ballarat & Clarendon College

Over the past year, a group of mathematics teachers from one Victorian school engaged in a process of professional learning called Lesson Study. In bi-weekly 'meetings' focused on the development of a single exemplary lesson, they questioned, pondered, discussed, debated, explored, and examined mathematics, and the teaching and learning of mathematics. This paper describes the process and the outcomes of what these teachers consider to be the most powerful professional learning they have experienced.

What is lesson study?

Lesson study is a model of teacher learning that was initiated in Japan. It involves small groups of teachers meeting regularly to engage in a collaborative process of lesson planning, implementation, evaluation and refinement. Key to their work is the hypothesising of anticipated student responses, the testing of those hypotheses, and the refinement of the lesson design. The groups typically meet weekly or bi-weekly for several hours and focus on only a few lessons over the year with the aim of perfecting them. Once the lessons have been refined to a point of 'readiness' where the group feels they can not perfect them any further – usually after several months or even years –they are shared with other teachers and other schools, complete with development and test information, and expected student responses to questions and problems. Skills gained through the detailed process of observation and analysis in lesson study transfer to teachers' work on other lessons. As Stigler and Hiebert (1999) report:

> The premise behind lesson study is simple: If you want to improve teaching, the most effective place to do so is in the context of a classroom lesson. If you start with lessons, the problem of how to apply research findings in the classroom disappears. The improvements are devised within the classroom in the first place. The challenge now becomes that of identifying the kinds of changes that will improve student learning in the classroom and, once the changes are identified, of sharing this knowledge with other teachers who face similar problems, or share similar goals, in the classroom. (Stigler & Hiebert, 1999, p. 111)

In Japan, lesson study is highly valued and regarded as the linchpin of the improvement process. This is because lesson study enables the steady improvement of teachers and teaching, through the gradual improvement of individual lessons and through the knowledge developed and shared during the lesson study process. Stigler and Hiebert (1999) highlight the virtues of such an approach:

> What is most impressive about Japan is that the culture genuinely values what teachers know, learn, and invent, and has developed a system to take advantage of teachers' ideas: evaluating them, adapting them, accumulating them into a professional knowledge base, and sharing them. The Japanese have created a national researchand-development system, based on teachers' experiences, that ensures the gradual improvement of teaching over time. (Stigler & Hiebert, 1999, p. 112)

A question of much interest is, "Can such a system be developed elsewhere, and in particular, in Australia?"

Lesson Study at Ballarat and Clarendon College

In recent years, lesson study has gained increasing interest in the United States. Several lesson study groups have been formed in different parts of the country, networks have been established to enable teachers involved in lesson study to share their experiences, and lesson study members have published articles and reports about the work of their lesson study groups (see for example, HREF1; HREF2; Fernandez, 2002).

In Term 4 of the 2004 school year, two lesson study groups were initiated at Ballarat and Clarendon College in Victoria, as part of their whole school strategic professional development. One group focused on numeracy, and the other on literacy. The groups were continuing to work together at the time this paper was written (June, 2005). This section describes the lesson study process undertaken by the numeracy lesson study group at the College.

Culture, readiness, and set-up

Ballarat and Clarendon College has always been a learning centre, however over the past five years there has been increased focus on developing this concept through all sections of the college. In addition to learning being regarded as central to students' lives, now there is also an explicit expectation that the school is a centre for teacher learning and the improvement of teaching.

The college has two 'whole school commitments' for 2005. One commitment relates to the ongoing development of learning continuums, and the other relates to the learning that is to occur within the organisation, as stated below.

- Excellent practice in every learning situation for everyone in the organisation:
- Each staff member to be actively involved in performance management.
- Teaching practice to be defined by evidence-based research.
- Each teaching lesson to follow the 'structured lesson' plan.
- Evidence-based best practice for teaching and learning to be documented for continuous teacher reference.

The facilities and structure of the College assist teacher development, reflection, improvement and learning. There are four observation classrooms in the College that are equipped with video cameras. These classrooms are scheduled on the timetable for regular lessons, but they can be booked for specific lessons or meetings for video

recording or for observation by colleagues. Teachers take advantage of this unique facility and have become increasingly comfortable with this form of professional development. The structure of the college involves all teachers in performance management, which is a supportive process that enables classroom teachers, along with their performance managers, to focus on areas for improvement. The culture of advancing the learning of both students and teachers is continually developing, and is a recognized strength of the college.

In 2004 teachers at Ballarat and Clarendon College were at a stage where they were keen to focus on in-depth curriculum based learning in the classroom. This was evident with the enthusiasm teachers demonstrated when volunteering to be part of the initial numeracy lesson study group. The lesson study concept was outlined and a group of seven teachers from Year 3 to VCE joined a consultant to form the numeracy lesson study group.

The logistics associated with organising meeting times were difficult, as it was clear that longer meetings would enhance discussion, but when could they be scheduled to enable everyone to attend considering the other school commitments the members of the group had? It was decided that meetings would run every second Thursday afternoon for two hours. The school was committed to lesson study and supported these meeting times with class cover when it was required. The scheduling of meetings continues to be one of the most challenging aspects of this form of professional development.

Early meetings

During the first meeting, the numeracy lesson study group discussed key elements and conditions associated with the way their group would work, the consultant provided an overview of the lesson study process, and together they began working on their research theme. Importantly, the group first distinguished their meetings as being focused on the research and study of lessons, rather than as curriculum meetings. They assumed collaborative ownership and organisation of the meetings, and they discussed roles, responsibilities, and commitments, as well as logistics about meeting dates and times. They also agreed to videotape all of their meetings so that they would have a permanent record of their work. The consultant then described the 'steps' in the lesson study process using the handout displayed in Figure 1.

'STEPS' IN THE LESSON STUDY PROCESS

Defining the research theme
(overarching view of what you want students to be like)

Defining the mathematics/literacy topic and goal
(identification of a core concept and articulation of clear goals)

Developing the concept map
(specification of the concept's connectedness to other concepts and skills, within and across year levels)

Selecting the mathematics/literacy context
(selection of the mathematics or literacy focus for the research lesson)

Selecting the lesson context
(analysis and selection of the particular problem or context for the research lesson)

Planning the research lesson
through the lens of students and through the lens of the teacher
(construction of the research lesson plan from two perspectives)

Designing the lesson observation tools
(customisation of a tool for observing the lesson)

Teaching the research lesson
(implementation of the lesson representing the best thinking of the group)

Reflecting on and debriefing the research lesson
(reflection on the lesson plan and evidence collected, and the goals)

Revising the lesson
(adjustments and refinements based on what students know and don't know, and the strengths and weaknesses of lesson segments)

[Adapted from, *Lesson Study Through a Mathematics Lens*, LessonLab Inc. 2004]

Figure 1. 'Steps' in the lesson study process.

The group then began work on identifying a research theme. During this time they discussed overarching ideas about what they wanted students to know and be able to do with respect to mathematics, and they identified specific areas and topics of difficulty for their students. After much rich discussion, the teachers agreed that the following statement reflected their intentions for their students:

> *Students will have a deep understanding of basic mathematical concepts and have the capacity to think mathematically in order to make mathematical decisions.*

The teachers concluded the meeting by assigning tasks to be completed prior to the next meeting. These included reflecting on the list of ideas and topics discussed, selecting one or two that the group could focus on, and writing a rationale for why this topic would be a good choice as the focus for their lesson study work. The teachers agreed to share their rationales with one another prior to the next meeting using dedicated space on the school's electronic noticeboard.

In the second meeting, the teachers discussed a myriad of ideas, topics and issues associated with the rationales they had written and shared. The discussion was very rich and detailed, and many questions about mathematics, and mathematics teaching and learning, were raised and contemplated. The group eventually decided to focus their work on fractions, and expressed interest in working specifically on conceptual understandings of fractions. The consultant proposed that the group read a chapter titled Developing Fraction Concepts from John Van de Walle's (2004) text, *Elementary and Middle School Mathematics: Teaching Developmentally*, as a stimulus for discussion at the next meeting.

The teachers also decided to bring to the next meeting resources they use for teaching fraction concepts.

During meetings 3 through 5, the teachers worked intently on determining key fraction ideas and concepts, and appropriate methods for supporting students' developing concepts of fractions. The reading from the Van de Walle text was quite provocative and therefore generated tremendous discussion among the group. Over this time, the teachers analysed the Van de Walle text and other research articles related to fractions, they explored some new teaching approaches in their classrooms, and they discussed, debated, and pondered different approaches to teaching fractions. By the end of the school term, the teachers stated that their own ideas and beliefs about teaching fractions had been challenged and that they were now in the process of reconceiving key ideas about fractions, and ways to teach this area of mathematics effectively. The group had worked through the first five 'steps' in the lesson study process (see Figure 1), and were ready to begin the design of their research lesson in the new year.

Early impressions and later progress

After only a few lesson study meetings, participants in the process began to express very positive feelings about being involved in it. The teachers reported that they felt they really 'owned' the process, they enjoyed working with colleagues from across the College, and they were gaining immediate benefit from the professional discussions taking place. The teachers stated that their consciousness was heightened with regard to their classroom teaching. Even at this early stage this included reflections related to the delivery of material, questioning, consideration of student responses, as well as the learning demonstrated by students through the work they were completing. The consultant and administrators observed a depth and richness of discussion about mathematics and the teaching and learning of mathematics that surpassed any previous professional development activities they had been associated with. Reflections about the key elements of the lesson study process that make it so successful are presented later in this paper.

Discussion and research regarding the teaching and learning of fractions encouraged teachers in the lesson study group to question and reflect upon the way they deliver the curriculum and expect students to learn the concepts and skills involved in all areas of mathematics. The meetings during 2004 developed the group's common understanding of what was expected from mathematics education, the way the curriculum can be delivered, and the ways in which different aspects of teaching and learning are related (including activity delivery, questioning, setting tasks, student discussions, teacher feedback, and student assessment items). By the start of 2005 the group had worked through to a point where the specific research lesson became the focus. At this time, meetings involved recounting fraction lessons trialed in current classes with follow up discussion and formulation of ideas of how fraction concepts are learned, what tasks allow students to demonstrate their understanding, and the order in which concepts should be learned. Discussion flowed freely and the sharing of expertise, ideas and concerns continued. Classes were videotaped to enable review of particular aspects of teaching, and teachers observed each other in mathematics classes to gain a greater appreciation of their delivery of the mathematics curriculum. The backdrop for all of these tasks was the area of fractions, and a stage was eventually reached when the lesson study group was ready to write the lesson plan for the research lesson.

Although the writing of the research lesson took place over two lesson study meetings (i.e. four hours), the formulation of the understanding required for the writing of the lesson started seven months prior, in Term 4 2004. It was quite exciting to reach this stage of the process and the teachers' felt that the increase in their understanding of the teaching of fractions placed them in a knowledgeable position to be able to prepare and plan an inspiring lesson promoting depth in understanding of the set outcomes.

Evaluation and outcomes

Once the research lesson had been taught, evaluating it proved challenging. Although the group had been extremely open and honest regarding the critique of each other's lessons on previous occasions, this evaluation seemed more difficult. The teacher followed the lesson plan as stated and the student responses were often as predicted. However, the lesson was not perfect and changes were required. After seven months of preparation how could it not be perfect? As teachers' understand, there is always room for improvement in classroom practice and this was no exception. One of the main criticisms of the lesson was that it required more time than it was initially allocated. After much discussion, the original lesson was refined and divided into two lessons. At the time this paper was written, the refined research lesson had not been taught.

For the teachers involved in this lesson study group the benefits of engaging in rich discussion about mathematics teaching and learning is unquestioned. Teacher's professional reading increased and this in turn improved the teachers' knowledge with respect to current best practice. The discussions continued away from the meeting times and have affected the classroom practice of each teacher involved in the group. Enthusiasm for mathematics teaching increased, because teachers were engaged in relevant professional development that could be immediately applied, reflected upon, and discussed with colleagues.

At a faculty level, expertise was shared between staff, and the respect and acknowledgement of each other's skills and ability increased. Important ideas associated with mathematics teaching and learning were focused on, and for those teachers in the group, a common understanding of these was developed. Although not every mathematics teacher at the College was involved in the lesson study group, the concepts and ideas discussed during lesson study were shared with other members of the faculty through the regular interactions the lesson study teachers had with their colleagues.

At a school level, lesson study demonstrated to all staff that there was strong expertise along with great learning taking place in the mathematics department. As a form of professional development, lesson study proved to be time effective, as it takes place on site and can be planned around existing programs. The enthusiasm of the lesson study teachers towards developing their professional expertise and sharing ideas set a positive tone and influenced other College staff in a similar manner.

Reflections on key elements to success

What are the key elements of lesson study that lead teachers to consider it to be the most powerful professional learning they have experienced? And, what kinds of observable initial outcomes encourage administrators and consultants to continue to invest in this model of teacher learning?

Teachers at Ballarat and Clarendon College reported that they valued the following key elements of the lesson study process:

- *opportunities to engage in serious and rich discussions about mathematics, and about teaching and learning mathematics* –discussions that have an "unrelenting focus on student learning" (Stigler & Hiebert, 1999, p. 121), and an immediacy with respect to teaching plans and implementation;
- *opportunities to be challenged by questions about mathematics and mathematics teaching and learning, to determine gaps in their own understandings, and to develop deeper understandings of content and pedagogy* –through reading research, discussing and debating issues, and exploring ideas in their classrooms;
- *opportunities to learn with and from one another as professional colleagues* – including the development of "a shared language for describing and analysing classroom teaching" (Stigler & Hiebert, 1999, p. 123), and the focus on one research lesson that is regarded as a group joint product;
- *opportunities to critically observe and analyse classroom practice*; and,
- *opportunities to develop new knowledge and contribute to the overall improvement of mathematics teaching*.

Specific conditions that the teachers identified as crucial to the success of their lesson study work included:

- *time afforded to the process*; and,
- *commitment demonstrated to the process by peer-participant-colleagues, administrators, and the consultant* –including factors such as attendance and participation, dedication to tasks, and resourcing, and funding.

The kinds of initial outcomes of the lesson study process that have encouraged Ballarat and Clarendon College administrators and consultants to pursue this model of teacher earning, include:

- *teachers are engaging in serious discussions and asking important questions about mathematics and mathematics teaching and learning* –both in and outside of the lesson study meetings;
- *teachers are engaging in the research process not only in the lesson study meetings, but also in their classrooms* –regarding their lessons as providing opportunities to learn more about teaching and learning, and being prepared to hare what they learn with colleagues, and to learn from colleagues;
- *teachers are demonstrating increased enthusiasm for mathematics teaching and or engaging in the process of improving mathematics teaching*.

Future directions for the numeracy lesson study work at Ballarat and Clarendon College include extending the work of the existing group to consider other research lessons, and beginning new groups for mathematics teachers not involved in the first lesson study process. In addition, a formal summative evaluation of the work of the groups is planned.

As a model of teacher learning, lesson study has much to offer. With its unrelenting focus on student learning, and its capacity to be an integral part of whole school strategic teacher professional development, its potential for making a difference in the improvement of mathematics teaching and learning is great.

Further information

While this paper provides an overview of what was involved in setting up and implementing lesson study in one Victorian school, the level of detail presented is

necessarily limited. The authors would be happy to provide further information regarding what they have learned about the lesson study process to those interested.

References

Fernandez, C. (2002). Learning from Japanese approaches to professional development: The case of lesson study. *Journal of Teacher education*, *53*(5), 393–405.

LessonLab, Inc. (2004). *Lesson study through a mathematics lens* (Online course). Los Angeles, CA: LessonLab.

Stigler, J. W., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. New York: The Free Press.

Van de Walle, J. A. (2004). *Elementary and middle school mathematics: Teaching developmentally* (5th ed.) Boston: Pearson Education.

HREF1

Papers and Presentations 2002 and 2003, Research for Better Schools. http://www.rbs.org/lesson_study/index.shtml Accessed July 1, 2005.

HREF2

Lesson Study Research Group, Teachers College of Columbia University. http://www.teacherscollege.edu/lessonstudy/ Accessed July 1, 2005.

AAMT STANDARDS: 2.2

Copyright