Lesson Study, a trip to Japan

Rosa Archer describes ideas from the Lesson Study approach she observed in Japan that she feels are transferable to the English context.

In this article, I describe how my understanding of Lesson Study developed following a trip to Tokyo Gakugei University in June 2015. While post-lesson analysing and reporting my reflections, I describe episodes of lessons and conversations from post lesson discussions that I found memorable. In order to provide a purposeful reflection, I will focus mainly on ideas that I feel might be transferable to the English context.

Lesson Study (LS) is a collaborative professional development tool that originated in Japan. In the LS cycle, teachers collaboratively plan a lesson, observe and then analyse, reflect and discuss these observations in a post-lesson discussion (Fernandez and Yoshida, 2004). The purpose of LS is not to produce the perfect lesson but to improve teaching. The experience is used to address particular issues relevant to the school or more generally to the whole of the Japanese school population; since the aim of LS is to improve pedagogy and learners’ understanding of mathematics the observations focus on the learners’ progress and not on the teacher’s actions. During the post-lesson discussion the presence of a ‘knowledgeable other’ (this could be a university professor or a more experienced teacher) is essential in guiding the teachers on how to take their research question further. In this sense, the LS cycle is not seen as final. It is not supposed to give an answer to a question but to provide a deeper understanding of a difficult issue (Fujii, 2014).

In the last 10 years, LS has become increasingly popular internationally, especially in the UK and US, and various models and interpretations have developed. Even in Japan, the models vary considerably. I will report here on the model I observed at Tokyo Gakugei University. In Japan, the core idea of LS is its enquiry stance; when working on LS the teachers have a shared focus, a research question, this could be around issues central to the school or topics that are difficult to teach. For example, on the second day of the trip to Japan we visited a state elementary school in Tokyo whose research focus was on "increasing children's enjoyment of mathematics by valuing their questions and allowing them to enjoy reasoning and expressing mathematical ideas". The focus was chosen since the teachers discovered, by surveying the children, that the number of children who enjoyed mathematics lessons at the school had declined. The school had been working on this focus for four years and had conducted eight LSs each year.

I have been working with LS for the past eight years and I have been able to appreciate how powerful it can be in supporting teacher development. I have read widely and observed LS cycles in London and Manchester schools, as well as facilitating some LS cycles with student teachers at the University of Manchester, reported at BCME 8 (Radovic 2014). However, during my trip to Japan it became clear that I had developed my own interpretation of LS and acquired some misconceptions along the way. The fact that I had developed my own interpretation is not necessarily a negative thing. I strongly believe that however effective a model may be, it cannot simply be lifted and used without taking careful account of cultural differences. Being fully immersed in LS for two weeks, visiting Japanese schools and observing several classes gave me the opportunity to develop a better (but in no way fully comprehensive) understanding of Japan's rich and complex culture and appreciation of those aspects of LS that might be replicated in the UK.

Before my trip to Japan, I understood the importance of having a research focus for LS but I underestimated the role of the ‘knowledgeable other’ in giving the lesson an enquiry dimension. It is clear that the Japanese teachers see themselves as researchers and engage with teacher enquiry at a deep level through the LS process. This is evidenced by the detailed lesson plans they produce, which are often accompanied by data from surveys that teachers have carried out before engaging in LS. The knowledgeable other, being an expert teacher and/or a researcher, has the role of facilitating the enquiry and guiding teachers in their pursuit, which might involve giving them further reading to reflect on after the lesson. Before coming to Japan, I was not sure if the re-teaching of the lesson to a different class, after the post-lesson discussion, was an essential part of the experience. I have come to the conclusion...
that re-teaching can be useful (for student teachers in particular) but it is not essential. In fact, the end product, the lesson, is not the most important part of the process. The most important experiences during LS are all the pedagogical conversations between colleagues. I was also able to appreciate that there is a fundamental difference between a demonstration lesson or master class and LS. In Japan, even a problematic lesson with a good final post-lesson discussion and good commentary affords a serious learning opportunity.

Post-lesson discussions in Japan take a different format according to different contexts. In all cases I observed, it was evident from the discussion that the planning team worked collaboratively and were keen to reflect on their joint work. The post-lesson discussion always ended with advice from the ‘knowledgeable other’ (Japanese: koshi) who gave the teachers advice on how to continue their research. Certainly feedback needs to be honest and constructive but I think that here in the UK teachers should be comfortable while conducting LS and not be made feel this is yet another performance management tool or, even worse, an inspection. Teachers need to feel free to experiment in order to extend their pedagogical knowledge. When I asked our Japanese colleagues, I was told that LS in Japan is not linked with performance management or pay scales, which, I believe, allows teachers more freedom to experiment and try new teaching ideas. One thing that I really liked was seeing colleagues working together as teams and talking about mathematics on a daily basis in an effective way and I am certain LS had a part in cementing these teams. It was good to see colleagues celebrating together after the lesson. They did not necessarily celebrate having just seen the perfect lesson but celebrated learning together and developing themselves, the school and the profession in general. Japanese teachers do LS because they feel it is important and because they want to learn. As Professor Fuji (2014) said, “lesson study is like air” for Japanese teachers, they just breathe it. It is evident that teachers are trusted to be able to do their jobs in Japan. On the other hand, teachers trust the learners and their ability to succeed. I firmly believe that this can only be achieved if teachers feel trusted by the children, by the management (who sees them as researchers of their own profession) and, I suspect, also by parents. It is evident that there is strong commitment to LS in Japan, where teachers use Wednesday afternoons for professional development. It is on Wednesday afternoon that the long planning meetings happen before the LS lesson. In one case, I was told that the planning team had met eight times over a period of six months before the LS lesson.

In all lessons we observed in Japan, great importance was given to developing learners’ mathematical thinking. This was achieved through careful questioning and skilled use of board work. Compared to our English colleagues, Japanese teachers seemed less skilled in using different teaching strategies such as group work and pair work in order to engage the whole class and they hardly ever use technology to support teaching. Almost all of the lessons that we saw followed a similar format. They started with the teacher posing a problem to the entire class (Japanese: hatsumon). The question was carefully designed based on the Japanese national curriculum (they call it Course of Study) and textbook. The detailed lesson plan included information on what the children already knew and what they would learn in the future. Teachers tried to extend previous learning and on no occasion did we see a stand-alone lesson that was designed without taking consideration of what happened before or after. Questions were designed to be open but accessible. After the teacher had posed the question, learners had time to work on the problem individually (Japanese: kikan-shido). While students worked, the teacher circulated the room and took notes on the problem solving strategies used by different students. Unfortunately, often we saw children unable to get started and being left behind during this part of the lesson. This one problem posed by the teacher often became the basis of the discussion and the mathematics that occurred for the entire one hour lesson. After the individual work phase, the teacher facilitated the sharing of solutions/ ideas and allowed learners to critique different strategies (Japanese: neriage). This was not always carried out successfully in the lessons we observed.

As there was a lot of time to discuss only one question the teacher could ask some deep questions and encourage children to think mathematically. The detailed lesson plan often described what the teacher would be looking for when choosing learners’ work but there was little or no evidence of differentiation. The board work and many of the children’s notebooks are works of art and carefully capture, not a procedure or an algorithm, but genuine mathematical thinking. Nothing was deleted form the board in order to give learners a clear view of how the mathematical thinking developed during the lesson. The last phase of the lesson (Japanese: matome) allowed the teacher to give a summary of group findings and identify
and generalise important ideas. During this phase children wrote lesson reflections in their books.

The children did not seem to be bothered by the number of adults (up to 60 in some cases) circulating the room while they were working. Observers were allowed to look over children’s shoulders at their work and sometimes they got quite close to them in order to take photographs, but they were not allowed to talk to the children as Japanese teacher believe this might interfere with the research.

I was fascinated by how our Japanese colleagues use the textbook. I understand that textbooks take many years to write in Japan and the pedagogy behind them is robust. The teachers I met seem to appreciate how the textbook encourages the development of mathematical thinking but instead of relying on them exclusively when teaching they use them as a starting point. There are only six textbooks to choose from in Japan, which are also approved by the government. The content is strictly based on the Course of Study and on research (carried out via LS). This is in striking contrast to the UK where many schools avoid using textbooks and teachers spend hours writing their own resources or finding resources online. This is time-consuming for UK teachers and can result in teachers using resources that are not quality assured nor wholly appropriate. Our Japanese colleagues have the advantage that curriculum change is introduced slowly after careful consideration. I was surprised that the new version of the mathematics curriculum was announced in March 2008 and only implemented in April 2011 (Takahashi, 2014). This gave experts plenty of time to consult with teachers, do LS and write the textbooks.

All of the Japanese teachers, at elementary level in particular (where the teachers are not subject specialists), showed a depth of subject knowledge that impressed me. I enjoyed observing how comfortable teachers were moving between different mathematical representations. I became convinced that LS can be used in a powerful way to develop teachers’ subject knowledge. The detailed collaborative discussion and reflection on how to better present a certain topic to children can allow teachers to reflect on their own mathematical understanding. I have witnessed lengthy discussion after a grade 5 (equivalent to year 6 in the UK) lesson in a primary school of whether it is better to use $320 \div 1.6$ or $330 \div 1.5$ when developing the concept of division with decimals. The teacher had started the lesson by showing the children 2 bottles of juice, one containing 1 litre of juice and costing 216 Yen and another containing 2 litres of juice and costing 420 yen. The children soon recognised that in order to compare the cost they needed to divide 420 by 2. Then the teacher showed them a 1.6 litre bottle costing 320 Yen in order to start developing the idea of division by decimals. After the lesson some colleagues suggested that 330 Yen and 1.5 litres was a more appropriate choice for the numbers. In fact, they believed that the 1.5 litre problem would be more intuitive and could allow the children to see the mathematical problem before moving to less obvious cases. Other colleagues believed that this approach would have promoted procedural understanding and encouraged children to follow an algorithm instead of deepening mathematical understanding. The latter colleagues believed that the mathematical struggle with a difficult new concept promotes deep mathematical understanding and that over simplifying problems might not support conceptual understanding.

While these discussions seemed a little unusual to start with, I soon realised how powerful they were in allowing teachers to think mathematically and therefore deepen their subject knowledge.

Another lesson where the teacher’s depth of subject knowledge was particularly evident was a grade 5 lesson (children aged 10 to 11, equivalent to UK year 6). The research question for this lesson was, “How to encourage learners to write down the reasons and the methods that led to their answers using words, pictures, diagrams and/or mathematical expressions”. The teacher’s intention was to use the double number
line to help learners express division calculations as fractions and distinguish between division as sharing and division as a way to express a relationship between different quantities (what they translated as ‘times as much’). Learners had previously worked on expressing the result of a division calculation with the quotient and the remainder or to continue dividing to get a decimal number as the quotient. They had learned that a decimal number may be used to express “times as much” and the meaning of “times as much”. They also learned that fractions may represent a way to equally partition a whole or a specific measured quantity and can add and subtract fractions and understand equivalent fractions. The intention of this lesson was to make links between topics that had been previously studied separately and to allow learners to articulate their understanding of these links. By supporting a deep understanding of the relationship between whole numbers, decimal numbers and fractions, the teacher intended to prepare the learners to multiply and divide fractions the following year.

The teacher began the lesson by displaying the distances travelled by four people to the school: 4km, 2km, 3km and 1.5km. Learners immediately recognised the “2 times as much” between 4km and 2km. The teacher wrote several representations of the problem (4 × 0.5; 4 ÷ 2; 4 × ; … ) on the board and encouraged the learners to link them by asking questions. As for the lesson before the numbers were carefully chosen so that the solution would be familiar to the learners, who were confident working with ½. The teacher spent a considerable amount of time discussing the different representations of the problem and used questioning in order to allow learners to articulate their understanding of the mathematical concepts involved. She kept asking them “What does this 2 mean? Is it twice as much or is it 2km?” After that she moved to the slightly more complex example of 3km and 1.5km.

Then the teacher said, “The distance between Student A’s home and school is 4km, the distance between my home and the school is 3km. Compared to that distance, how many times as much is Student A’s house?”

The numbers for this lesson were selected because quotients such as 4 ÷ 3 = 1.3333... and 2 ÷ 3 = 0.6666... cannot be expressed in decimal form. Moreover, since it may be difficult for students to make sense of “small number ÷ large number” and ‘less than 1 times as much,’ the planning team chose to start with the situation, 4 ÷ 3 = 4/3

At this point, the teacher used the double number line to represent the problem: if 3 on the top line corresponds to 1 on the bottom, then going from 3 to 4 multiplicatively corresponds to going from 1 to ⅔; going from 4 to 3 corresponds to going from 1.

During the whole ‘neriage’, she kept asking the learners to relate the numbers to the initial problem (What does 4 represent? What does 3 represent?) She constantly moved between different representations and used the idea of inverse operations (division and multiplication) by referring to the double number line, with arrows representing the directions of the operations.

This lesson persuaded me how powerful the use of the double number line can be in encouraging proportional reasoning. By the end of the lesson, all learners understood the relationship between 3km and 4km and were able to make connections between the different representations. They could also draw on their past knowledge of division as sharing. In fact, in the last phase of the lesson learners were able to apply what they had learned to new situations. I am also persuaded, after my visit to Japan, that lesson study can be an effective method to allow teachers to reflect on pedagogical issues and to develop their
learners’ subject knowledge as well as their own.

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References


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