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## ***Japanese Lesson Study: A Numeracy Coach's View***

**Abstract:** *This paper reports findings based on interview data from a professional teacher educator who was a Numeracy Coach for a group of schools that participated in a research project, Implementing structured problem-solving mathematics lessons through Lesson Study. The Numeracy Coach was a highly-skilled professional teacher educator, whose position was such that she was both a support person to the teachers and a participant in the project. Her insights into the processes and effects of Japanese Lesson Study, on teachers, as well as herself, are extremely enlightening, and form the data for this paper. While the evidence is from a single source, the evidence is consistent with other projects into the effectiveness of the Japanese model of Lesson Study. Aspects of the project with implications for teacher professional development are detailed.*

**Keywords:** *Japanese Lesson Study, Numeracy coaches, Teacher professional development.*

### **Introduction**

This paper reports on some of the findings of the *Implementing structured problem-solving mathematics lessons through Lesson Study* project, funded by Deakin University. The practice of Lesson Study has been recognized, world-wide, since it first came to attention through the Third International Mathematics and Science Study (TIMSS) video study (Stigler, *et al.*, 1999), as being the best example of effective professional development (Vermunt, 2014; Dudley, 2015). There has been enormous growth

of Lesson Study activity in the USA (Lewis, *et al.*, 2006), with more recent large-scale adoption in the UK (Dudley, 2015), South-East Asian countries, many African countries, and Australia (e.g. Widjaja and Vale, 2013).

As part of this project, participating teachers and a Numeracy coach were interviewed throughout the Lesson Study cycles, and the perspective of the Numeracy coach, a subject specialist, on the effects of Lesson Study, is the basis of this paper.

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## Japanese Lesson Study

To the casual observer, Japanese Lesson Study may seem like a simple idea. Teachers with a common focus meet and plan lessons together. These lessons may have a focus on building skills or understanding, and are known as “research lessons”, which are taught by one teacher, and observed by, not only all of the teachers who are doing the planning, but also by observers who, at one end of the spectrum, may come only from the teachers’ own school, or, at the other end, may come from all over Japan (see, for example, Lewis and Tsuchida, 1998). A de-briefing session (post lesson discussion) follows the lesson, where the lesson is discussed at some length, with modifications often suggested by the observers, who normally include an invited academic or “veteran teacher”, also known as the “knowledgeable other”. This knowledgeable other summarises the discussion and provides supportive and educative comments on aspects of the research lesson (for a detailed account of the the role and practices of the “knowledgeable other” see Takahashi, 2014).

According to Lewis (2002), the four steps to creating and conducting a Lesson Study cycle are: collaborative planning by teachers; teaching or observing the lesson as it is taught; teacher discussion of the lesson; and reflection on the learning from the lesson. This closely resembles other suggestions for effective teacher professional development as found in Ricks (2011) on process reflection, and Joubert and Sutherland (2009) on effective Continuing Professional Development (CPD). For a more detailed description of Japanese Lesson Study, see Takahashi, 2006.

Thus, in the Japanese Lesson Study model, research lessons serve as the basis for teachers to be reflective practitioners, as they give and receive feedback, analyse students’ learning, and reflect on lessons during a post-lesson discussion. Ricks (2011) claims that “teacher reflection is vital for teachers’ development by generating knowledge grounded in practice” where reflection is “a process of developing

and testing ideas in the crucible of action” (p. 251). Further, Darling-Hammond *et al.*, (2009) found that “intensive professional development, especially when it includes applications of knowledge to teachers’ planning and instruction, has a greater chance of influencing teaching practices and, in turn, leading to gains in student learning” (p. 9). We contend that Japanese Lesson Study is a model of such effective professional development; is grounded in practice; and tests ideas in the crucible of the classroom. Further, it fits the Joubert and Sutherland (2009) finding that a “key recommendation emerging from the literature is that professional development programmes should be grounded in classroom practice, allowing teachers to experiment with new ideas and reflect on their experiences of doing so” (p. 21).

## The Project

The *Implementing structured problem-solving mathematics lessons through Lesson Study* project ran from 2012 until 2014. The project was located in a metropolitan region of Melbourne Victoria.

Interviews were conducted on a regular basis with participants in the project, and the extracts reported here are drawn from two of the interviews with the Numeracy Coach. According to Xu and Pedder (2015) in their review of research into Lesson Study, there is an

absence of the kind of theoretical work necessary for explaining how and why teachers learn both collectively and individually in LS contexts, and how features of LS procedures and contexts support and contribute to the individual and collective learning of teachers in LS. (p. 48)

In this paper we attempt to address this absence through the examination of interview data provided by a professional teacher educator, employed by a group of primary and secondary schools to support and improve teachers’ effectiveness in

mathematics. The interviews were conducted in 2012 and 2013, at the completion of Lesson Study cycles.

### **The Numeracy Coach**

“In some jurisdictions coaches, also known as mentors or expert teachers, provide a critical role in the establishment of professional learning communities through the development of openness, trust, and teamwork among colleagues” (Kostogriz, *et al.*, 2013, p.34). At the time of the project, “In each education region of Victoria networks of up to 25 primary and secondary schools in geographic proximity [had] been formed” (Vale, *et al.*, 2010, p. 48) and in these networks, coaches “... support the school and middle level numeracy leaders, coach individual teachers in the teams and attend professional learning team (PLT) meetings” (Vale *et al.*, 2010, p. 34). These Coaches were drawn from experienced classroom teachers, who, in the case of Paula (a pseudonym), was also an experienced mentor to teachers, and a well-known, and highly regarded presenter at mathematics education conferences.

In the light of her expertise and role within the network, it was fortunate for the Lesson Study research project that it had a Numeracy Coach as part of the team, as “after teachers and school leaders, coaches are the next most important change agents in schools (Fullan & Knight 2011). Successful coaches develop constructive relationships with individual teachers and build a culture of collaborative inquiry about their work (Knight 2011)” (cited by Kostogriz, *et al.*, 2013, p. 122).

Paula’s perspective on the project, then, was from that of a professional teacher educator, although she participated also as a teacher member of a Lesson Study planning team. This meant that in her interviews she was able to comment more broadly than the teachers, and gave her impressions as a school-based, professional teacher educator. Yarema (2010) suggests that “Lesson Study

... offers the opportunity for teacher-educators to study teachers’ thinking in a community setting” (p. 5) and this was borne out by Paula’s comments in her interviews. Further, because of her teacher educator background, Paula also had a strong focus on the procedures and contexts of the research project, as shown in her comments about the project cited below.

### ***Personal effects***

Her dual position as Coach and participant in the research project was problematic for Paula, for, as she says “I found it very challenging for myself in my role. I felt that I was sort of being very much directed [by the university team] not to share [my ideas or knowledge], but I found that really difficult when they [the teachers] came to a brick wall” (Interview 3 transcript, p. 5, Line 16). Also, she perceived other pressures from the university team: “when I actually trialled the lesson [and] ... I had shared [my findings] with the planning group ... it wasn’t appreciated [by the university team]” (Interview 3 transcript, p. 5, Line 22).

Further, as her professional rôle was to mentor teachers, when trialling one of the mathematics tasks for a research lesson, she

had a different purpose for why I was doing the lesson, I actually modelled it with 25 by 3 and I had specific purposes of why I chose 25. ... that was the challenging bit and I suppose for myself that goes back to that I really wanted it [the project] to be much more about teachers building content knowledge. (Interview 3 transcript, p. 5, Line 27)

This is to say, she was intent on experimenting and trialling ideas for her rôle as Numeracy Coach, not simply trialling for the research lesson planning. Paula also found that the project had changed some of her own practices: “I definitely get kids to share and talk about their work, but now I’m very strategic with whom I’m selecting and in what order”

(Interview 3 transcript, p. 7, Line 18). This was in response to learning about anticipating student responses to tasks, and ordering responses in terms of their mathematical sophistication, as part of lesson planning, in the Japanese Lesson Study model.

The “knowledgeable other” who delivers the comments and concluding remarks in a post-lesson discussion provided Paula with insights into “how to be critical but not nasty” when commenting on teacher lessons, which she does as part of her coaching work. A further incidental benefit of the project, according to Paula, was that it raised her profile within the Network and enhanced her other Network numeracy work.

### *Teacher effects*

Paula noticed the effects of the project on the participants, and made comments in her interviews about what she had noticed. There were four main themes. The first of these focused on the effects of professional readings. The research team provided professional readings about the Japanese model of Lesson Study to the participating teachers, which Paula saw as emphasizing how Lesson Study links research to practice, and thus can build, not only teacher pedagogical knowledge, but also teacher content knowledge.

Another theme was the high value put on of the sharing of experiences and resources, across schools, with a highlight being a first year teacher learning from a teacher with twenty years of experience.

Paula noted that trialling a task in one’s classroom “really increased the discussion – it was funny because the people who hadn’t trialed it, you could see really felt out of the discussion” (Interview 3 transcript, p. 5, Line 55). She suggested further that trialling the task was critically important, because it made teachers think about the implications of the language and about student responses to the task, a comment echoing Takahashi’s (2006) statement that

In Japan, these anticipated solution methods will include not only the most efficient methods but also ones caused by students’ misunderstandings. Thus, anticipating students’ solution methods is a major part of lesson planning for Japanese teachers (p. 6).

This suggestion re-appeared in a comment about how anticipated responses, found in trialling, provided insights into student thinking that turned out, as in Japan, to be critical for effective lesson planning.

The effect on the teachers of trialling tasks with students, supports Timperley’s (2008) suggestion that

Change appears to be promoted by a cyclical process in which teachers have their current assumptions challenged by the demonstration of effective alternative practice ... and observe resulting improvements in student outcomes. (p. 18).

Based on Paula’s perceptions, it appears that actually trying something in one’s own classroom can confirm, or not, what works, and provides evidence to convince others. In the case of trialling the research lesson task, it also meant that the planning team had evidence to support their discussion and lesson planning. Pauls also thought that a general benefit to the teachers who actually taught the research lesson was that they were now “noticed” by their colleagues and the school leadership, building their professional confidence.

### *Other effects*

Paula’s comments on broader aspects of benefits of the Japanese Lesson Study model focused on issues around collaboration. In particular, she saw teams across schools as a very valuable aspect of the project. Further, she also valued the team building highly – the idea of developing a culture of “we” rather than “I”.

In terms of particular aspects of the Japanese Lesson study model, Paula emphasized the value of the lesson observers, including the “knowledgeable other”, whose role is to offer insights into the lesson content and children’s learning. The other observers re-inforce the team aspect of Lesson Study in that they, too, focus on the planning team, not the individual teacher. Overall, Paula saw involvement in the project as building teacher confidence, to the extent that “I actually saw them like little peacocks puffing out their chests, you know I’m here, I’m presenting, what I’m doing is really worthwhile, people have come to listen to me” (Interview 3 transcript, p. 2, Line 14). Further, although Paula could not establish a real causal link, she stated that

as a result [a teacher] is a really good example of someone who as a classroom teacher is doing a great job, but as a part of this project has actually been highlighted and now is the numeracy co-ordinator at the school. And the same thing happened to [another teacher] too, great classroom teacher but his practice was spotlighted as a result of the project (Interview 4 transcript, p. 2, Line 39)

For the leadership of the school, Paula thought that the Japanese Lesson Study model of professional learning introduced principals to a valuable model for their schools, and that they were now talking to their Lesson Study project teachers about what they were doing.

However, Paula raised one issue with respect to the Research Lessons. She, insightfully, pointed out that they should not be “one-off” lessons, but be part of the team’s usual unit of work. In her view this would make the research lessons more meaningful in the context of the classroom. In fact, this was taken up when, later in the project, some research lessons were embedded in units of work.

Paula’s final comment on the project was that “the hierarchy: university mentors, Network staff, principals, and classroom teachers, all helped make

this a unique and valuable experience” (Interview 4 transcript, p. 5, Line 32).

## **Conclusion**

Reading through the transcripts of interviews with Paula, it is clear that she valued the collaboration engendered and supported by the Japanese model of Lesson Study very highly: her comments cited above demonstrate this too. This procedure of collaboration showed in team building, the “we” not “I”, and the sharing of experiences between teachers with vastly different numbers of years of teaching experience.

Another process in the Japanese model of Lesson Study that was considered productive was the trialling of the research lesson tasks with students not in the research lesson class. The evidence of student responses to the task that these trials provided stimulated discussion and gave the lesson planning team a basis for the anticipated student responses section of the lesson plan, as well as for the organization of the whole class discussion.

The context that builds confidence is found in lesson planning with colleagues, whether across, or within, schools, working on a joint project, and going public in a safe, supportive environment. The public research lesson is possibly the most confronting aspect of a Lesson Study cycle: yet Paula did not comment on this aspect of the cycle, apparently because the teachers did not express or exhibit any concerns.

Benefits to teachers in Lesson Study projects is not limited to improved content knowledge, but is also found in increased confidence, and a raised professional profile with one’s colleagues.

The over-arching context for Lesson Study in this project was supportive principals who re-organized classes and provided time for lesson planning team meetings, and, again, in Paula’s words, “the hierarchy: university mentors, Network staff, principals, and classroom teachers, [who] all helped make



this a unique and valuable experience” (Interview 4 transcript, p. 5, Line 32).

### Implications for practice

While this paper reports the view of a single person, the professional position and experience of that person cannot be discounted. Quite clearly Paula valued some aspects of the Japanese Lesson Study model more than others. The most valuable aspects can be summed up as: support from the school leadership and outside mentors, trialling lesson tasks in order to generate anticipated student responses, and collegiality in lesson planning.

Each of these is multi-faceted, and have different implications for other groups of teachers. The support of the school leadership is, undoubtedly, vital: classes may need to be re-arranged for planning meetings, teachers may need to visit another school if the planning team is across schools, and so on.

Mentors, with the necessary experience may not be easy to find, or are too busy to help. Trialling lesson tasks, is much more straight forward, and has benefits, rather than posing difficulties. It provides teachers with ideas about student responses, and makes planning a lesson less of a risk of failure. The implications are that everyone could, and perhaps should, trial new ideas in their own classroom, and then discuss the results with their colleagues.

Collegiality may be the hardest of the three valuable aspects of implementing the Japanese model of Lesson Study to achieve successfully. This is the single aspect that requires the most effort, and it requires effort from all the teaching and leadership staff. However, given the almost universal recommendations for successful and effective professional development for educators have collegiality as a *sine qua non* (see, for example, Darling-Hammond & Richardson, 2009) we may not have a choice but to achieve collegiality.

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### Јапанска „студија часа“: осврт инструктора рачунања

**Резиме:** У овом раду истражујемо који аспекти студије јапанског часа имају утицаја на наставнички рад, анализирањем података са интервјуа који су добијени од професионалног инструктора наставника, који је запослен у групи основних и средњих школа да би побољшао ефикасност наставника приликом држања наставе математике. Интервјуи су вођени током 2012. и 2013. године, по завршетку циклуса Студија часа а у циљу Имплементације структуралног решавања математичких проблема кроз пројекат Студија часа, који је трајао од 2012. до 2014. у школама које се налазе у метрополиском региону Мелбурна у Аустралији.

Подаци интервјуа, који су овде објављени, узети су из два интервјуа са инструктором рачунања. Инструктор рачунања су били искусни наставници, али у случају Пола (псеудоним), инструкторка рачунања је имала искуства и као ментор наставницима и била је цењени стручњак из области математичког образовања. У светлу њене експертизе и улоге у оквиру школских пројеката, било је веома важно да се истраже пројекти на којима је била ова инструкторка рачунања као члан тима. Полина виђење циљева пројекта је виђење професионалног инструктора наставника. То је значило да је у интервјуима давала шире одговоре него наставници и саопштила је своје утиске као инструктор наставника који ради у школи.

Пола је приметила ефекте пројекта на учесницима и ставила је коментаре у интервјуу о томе шта је приметила. Једна од Полиних оцерација тичала се стручних чланака. Истраживачки тим је пронашао стручне чланке о јапанској Студији часа за наставнике који су учествовали, које је и Пола видела као истражање како се Студија часа повезује са праксом и тако може да створи, не само наставничко педагошко знање, већ и садржај знања наставника.

Још један аспект који је окренула Пола је био да високо вредновани учесници буду могућности да деле искуство и изворе, међу школама и између наставника, са напласком да наставници који су почетници буду са наставницима који имају двадесет година искуства.

Пола је приметила, да је испробавајући задатак у својој учионици, подстигла наставнике да се више дубе у дискусије током састајака на којима су се планирали часови. Предложила је да је испробавање задатка критички важно јер је то натерало наставнике да размисљају о импликацијама језика и студентским одговорима на планиране задатке. Даље Полине оцерације су се тичале значаја подршке коју су јужали директори школа, за састанке на којима се правио план часова, реорганизовањем школског времена и часова. Према Поли, колегијалност може да буде најзахтевнији аспект јапанског модела Студије часа, у циљу усешне имплементације и захтева подршку и подстицај школске управе.

Сведоухвајне Полине оцерације и промена напашавају чиниеницу да искусни инструктор наставника може да буде критички фактор за идентификацију учења и



развоја наставника кроз искуства Студије часа. На пример, значај природних задатака часа је у томе што наставници добијају идеје о одговорима студентима и чине да планирање часа буде што боље. Импликације су ипак да сви могу, и можда треба да испробавају нове идеје у учиници које је Пола прихватила у свом раду. Пола је дала интересантан коментар о сарадњи наставника у току састања припремања часова, да су се језичке конструкције наставника поменила од „ја“ на „ми“.

Контекст у коме се издржава поверење наставника је у планирању часова са колегама, било да је то са колегама из других школа или у својој школи, или са колегама који рад на заједничком пројекту и који јавно настављају у сигурном окружењу које подржа и подрш. Јавно изражавање часа је вероватно најтежи аспект циклуса Студије часа: ипак Пола није коментаришала овај аспект циклуса, очигледно због тога што наставници који су били укључени нису изражавали или показивали било какве недоумице. Шта више, добродош за наставнике у оквиру овог пројекта није био ограничен на побољшање садржајног знања, већ у већем мерењу и што су колеге професионално цениле више једни друге.

**Кључне речи:** јапанска „студија часа“, менторски рад, инструктор, професионални развој наставника.