

# Parallelisms between Lesson Study and Design-Based Research

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*Lesson Study (LS) is a key agent of teacher growth in Japan and has spread to many countries over the past decade. Research on LS has been characterised mostly by narrative methodologies. Responding to the call for a more coherent and practice-based research methodology, Design-Based Research (DBR) has the potential to increase the impact and translation of research into locally-based educational practice. This presentation explores how DBR, which has emerged in the USA as a rejection of typical control-experimental research methods, and LS research can sit seamlessly together and how each increases potentiality in researching teacher growth.*

Developing from more than a century-old tradition, LS is the most dominant form of teacher professional development practice in Japan. Its promise of continuous and sustained learning for teachers had many international educators, for more than a decade now, bring LS into their own context and contribute to the literature by sharing narratives of their LS experience. However, misunderstanding and/or lack of understanding of LS and a non-systematic approach for conducting LS research have been identified (Wang-Iverson & Yoshida, 2005; Chokshi & Fernandez, 2004; Takahashi and Yoshida, 2004; Lewis, Perry, Hurd, & O'Connell, 2006; Watanabe, Takahashi, & Yoshida, 2008).

“Design-based research (DBR) is a methodology designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice” (Anderson & Shattuck, 2012, p. 16). It was a response to the need for a more coherent and practice-based methodology. It entails orchestrating forms of learning and systematically studying them within the context defined by the means of supporting them resulting to a greater understanding of a learning ecology (Cobb, Confrey, di Sessa, Lehrer, & Schauble, 2003).

This paper talks about the use of DBR as a methodology in an implementation of LS in two secondary schools in the Philippines, focusing on teacher growth. Using culture as the intervention, the study aims to promote a smoother implementation of LS in a non-Japanese context, particularly in the Philippines. Also, this paper will highlight the similarities of LS research to characteristics of a quality DBR study and how both can support each other in researching teacher growth.

### *Comparing Research on LS, DBR, and the Research Design*

Below are seven characteristics of a quality DBR study as identified by Anderson and Shattuck (2012). It is worth to compare these characteristics with features of LS research, and how the author's study used DBR to differ from the traditional LS research.

#### *Being situated in a real educational context*

DBR aims to improve the impact of research into practice so it makes sense that it be situated in a real educational context, as this will guarantee its effect on practice. LS is set in a school and is motivated by teachers' desire to improve student learning.

Two public secondary high schools were hosts for the study. Because culture was to be introduced as the intervention, location of the schools was also considered. An urban and a rural school were selected thinking that location and environment may influence the teachers' cultural and/or value orientations.

#### *Focusing on the design and testing significant intervention*

According to Anne Brown (1992), "an effective intervention should be able to migrate from our experimental classroom to average classrooms operated by and for average students and teachers, supported by realistic technological and personal support" (p. 143). Local context is assessed and relevant literature and theory are looked into. The design is aimed towards overcoming an issue or improving practice.

LS research is motivated by existing educational issues such as changes in the curriculum and improving student performance. However, it is almost always focused on student learning and not on teacher learning.

The author's study, on the other hand, focuses on the process of translating LS to a different national context and on the teacher growth that occurs. It aims to look at how culture may hinder or facilitate a smooth implementation of LS and affect teacher learning. Culture serves as the intervention for using a simple transference model for the implementation of LS.

In this study, two instruments were used to anticipate cultural challenges/barriers in the implementation of LS in the two participating schools. The first is the Values Survey Module for Teachers 2012 (VSMT12), based on Hofstede's Values Survey Module 2008. This was given to all teachers and was used to identify the teachers' existing cultural orientations according to Hofstede's dimensions of national culture, namely power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance, and long-term orientation (Hofstede, Hofstede, and Minkov 2010). Results from this instrument informed the strategies used by the researcher in the training and support given to the participating mathematics teachers.

The second questionnaire designed for this study, given only to the mathematics teachers from the two schools, is the Mathematics Teachers' Perception of a Good Mathematics Lesson, embedded in which are key aspects of mathematics teaching implied by Japanese LS (Fernandez & Yoshida 2004; Lewis 2002). Specific attributes of a good mathematics lesson can be matched to similar key elements within JLS. One key element would be taking into account the range of student responses to the questions including wrong responses. The results of this questionnaire identified the extent of mathematics teachers' endorsement of key aspects of Japanese LS. This questionnaire was evaluated before and after the research intervention. Results from

the initial administration of this test were used to determine the focus of the training given to the teachers. Also, changes in teachers' endorsement of key aspects of JLS before and after the project were analysed to identify what teacher learning occurred after their experience of the adapted LS.

#### *Using mixed methods*

DBR typically involves mixed methods (Anderson & Shattuck, 2012, p. 17). "It is perfectly logical for researchers to select and use differing methods, selecting them as they see the need, applying their findings to a reality that is both plural and unknown" (Maxcy, 2003, p. 59).

Though LS research normally employs use of observer-collected evidences during lesson demonstrations, students' journals, tests and teachers' reflections to look at student learning, research on LS that focuses on teacher learning mainly relies on qualitative data to show evidence of teacher change.

This study collected quantitative and qualitative data to assess teacher learning. Aside from the VSMT12 and the Mathematics Teachers Perceptions of a Good Mathematics Lesson, interviews were conducted at specific points in the cycles and at the end of the program. Teachers were also asked to submit lesson plans of successful lessons they have designed in the course of the program and to write reflections on their LS experience to identify what teacher learning has occurred as a result of their experience of JLS, and its impact on subsequent lesson planning and professional collaboration. Table 1 below summarises the different data collected which will be the point of comparisons and changes in teachers' behaviours and attitudes towards LS with and between the two schools.

Table 1  
*Differed forms of data gathered and evaluated*

	Instruments	Administration	Data to be gathered	Analysis
	VSMT12	Start of program	Cultural orientations of the school teachers	Scores will be used to identify strategies to be employed by the researcher during the teachers' workshops/meetings
Quantitative	Mathematics Teachers' Perceptions of a Good Mathematics Lesson	Start and end of the treatment (LS training and LS cycles)	Mathematics teachers' perceptions of a good mathematics lesson and their attitudes towards key aspects of LS	Pre-LS scores of mathematics teachers from both groups will be compared. Scores will be related to the school's VSMT12 scores. Pre- and post-LS scores of teachers within each school and across groups will be compared.
	Lesson Plans	At strategic	Changes in the	Changes in teachers'

		points of the treatment	mathematics teachers' way of planning their lessons as a result of the treatment/program	lesson planning across groups will be compared.
Qualitative	Interviews	End of each LS cycle	Mathematics teachers' reflection on every lesson demonstration	How these teacher reflections are incorporated in their own lesson planning will be evaluated.
	Reflection papers	End of each discussion group meeting	Mathematics teachers' learning from the professional development readings provided by and discussed with the researcher.	Comparison within each school & across groups, over the course of the treatment will be evaluated and analyse how much of these are reflected in their own lesson planning.

#### *Involving multiple iterations*

Characterised as “research through mistakes”, design and intervention may evolve through subsequent evaluations giving way to its continuous refinement (Anderson & Shattuck, 2012, p. 17; Cobb et al., 2003). LS research lessons go through a similar process. They go through several cycles, not necessarily modifying the lesson but incorporating new elements such as students' attempted solutions gathered in previous cycles. In this model, it is assumed that the modifications in the lesson also correspond to the teacher learning that has occurred.

In this study, the researcher worked with the volunteer teachers in implementing research lessons in 7<sup>th</sup> and 8<sup>th</sup> grade mathematics classes over three lesson cycles. The journal entries collected at the end of every group discussion meetings and end-of-cycle interviews informed the focus of the succeeding group discussion meetings. This research study was designed to permit multiple iterations in other schools in the Philippines. Even though the study has only been conducted in two schools, other practitioners can see what they need to do in their local setting. This study was designed to be replicable not just in Philippine schools but also in other countries.

#### *Involving a collaborative partnership between researchers and practitioners*

Because the teachers usually have busy schedules and not all have experience in doing rigorous research, collaboration with a research expert is necessary to guide them through the stages of the research. In turn, the teachers inform the research experts of the complexities of the educational setting (Anderson & Shattuck, 2012, p. 17; Cobb et al., 2003).

LS is collaborative in nature. Aside from working with each other in planning, implementing and evaluating of the lesson, they also seek support from university

professors, research experts, even colleagues from other schools, in determining the soundness of the design and content of the research lesson.

In this study, the role of the researcher was not just an outsider giving training to the teacher participants. He planned and designed lessons with them. The mathematics coordinator, district mathematics supervisor and a LS expert were also invited to participate in the lesson demonstrations.

#### *Evolution of design principles*

DBR does not aim to generalise design principles or to come up with theories that will produce the same effect in all contexts. Conditions in which the principles operate are always reflected as these are tools that aid in understanding and adjusting of the intervention (Anderson & Shattuck, 2012, p. 17; Cobb et al., 2003).

In this study, aside from providing teachers with a venue to understand student thinking and to improve practice, there was a gradual release of responsibility from the researcher to the teacher participants giving them a chance to take on different roles which influenced the dynamics within the LS group and the focus of the discussions during meetings.

Principles on typical research on LS though remain unaltered. Only the research lesson is modified in every cycle because lessons are taught to different groups of students in every cycle making the research lesson a rich source for opportunities to understand student thinking and to improve practice.

#### *Comparison to action research*

Apart from the fact that action research is usually carried out by the teacher alone with no collaboration with research experts, DBR is centred on the evolution of design principles that “is conceived not just to meet the local needs, but to advance theoretical agenda, to uncover, explore and confirm theoretical relationships” (Barab & Squire, 2004, p. 5).

For the same reason, research on LS is not action research. It is focused on building up a body of knowledge on local practice which becomes a source for improving student achievement and collective capacity building.

This study is also not an action research. Guided by a flexible design, its implementation and results are expected to vary between different contexts in the Philippines and in other countries. This study provides insights on creating an environment conducive for LS in a non-Japanese context.

#### *Practical impact on practice*

DBR is a practice-based methodology. The point of educational research is to impact on educational practice the way medical researches do on medical practice. LS does the same by providing teachers with opportunities to strengthen their content and pedagogical content knowledge through interaction with the curriculum, content, colleagues and the classroom. However, these typical researches on LS expect that other teachers are able to draw principles from it and there are no mechanisms for addressing cultural impediments.

In this study, the instruments used are meant to inform implementation in other schools rather than provide a recipe for teachers to follow. The results are expected to throw light on the conditions necessary in Philippine schools for the effective

composition and operation of LS groups, the processes required for lesson planning, and a school's strategic orientation to LS. The combination of these data sets and their analysis will enable the researcher to identify the adaptations necessary to promote a successful and sustainable transfer of Japanese LS to a different national context.

### *Conclusion*

DBR seeks to improve the translation of educational research into practice while LS seeks to produce better student learning and enhance teachers' content and pedagogical content knowledge through collaborative practice. There exists parallelisms between the two but, in conventional researches on LS, some principles guiding research are often left assumed and stated implicitly. DBR can support research on LS by pointing to ways in which research on LS needs to be undertaken in a non-Japanese environment. As seen in the researcher's implementation in the Philippines, using the DBR methodology with culture as the intervention, LS served as a vehicle for research on teacher growth and effecting change in practice.

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