

The Development of Lesson Study in Malaysia: Issues and Challenges, and Its Contribution Towards Mathematics Education

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Abstract

This article examines the development of Lesson Study in Malaysia. Lesson Study was introduced in Malaysia as small-scale research studies beginning in 2004. This was followed the country's participation at the APEC HRDWG Lesson Study Project as part of international cooperation. By 2011, Lesson Study had been upscaled, reconceptualized and included in the nationwide Professional Learning Community Project. While generally, feedback from these events show the great potential of continuing Lesson Study as a professional development approach, there was also a lack of confidence among the teachers to implement Lesson Study on their own. This study discusses the implications of these events from the perspective of the needs of the mathematics education professional community. Suggestions to revitalize and sustain Lesson Study in Malaysia are included in the discourse.

Keywords: Lesson Study. Teacher Professional Development. Educational Borrowing. Professional Community

El Desarrollo del Estudio de Lecciones en Malasia: Problemas y Desafíos y su Contribución a la Educación Matemática

Resumen

Este artículo examina el desarrollo del Lesson Study en Malasia. El Lesson Study se introdujo en Malasia como estudios de investigación a pequeña escala a partir de 2004. Esto siguió a la participación del país en el Proyecto de Lesson Study del APEC HRDWG como parte de cooperación internacional. En 2011, el Lesson Study fue mejorado, reconceptualizado e incluido en el Professional Learning Community Project nacional (en español, Proyecto Comunitario de Aprendizaje Profesional nacional). Si bien los comentarios generales de estos eventos muestran el gran potencial del Lesson Study en curso como un enfoque de desarrollo profesional, también hubo una falta de confianza entre los maestros para implementar el Lesson Study por su cuenta. Este artículo discute las implicaciones de estos eventos desde el punto de vista de las necesidades de la comunidad profesional de educación matemática. El texto incluye sugerencias para revitalizar y sostener el Lesson Study en Malasia.

Palabras clave: Lesson Study. Desarrollo Profesional de los Docentes. Préstamo Educativo. Comunidad profesional.

O Desenvolvimento do Lesson Study na Malásia: Questões e Desafios e sua Contribuição para a Educação Matemática

Este trabalho examina o desenvolvimento do Lesson Study na Malásia. O Lesson Study foi introduzido na Malásia como estudos de pesquisa em pequena escala a partir de 2004. Isso ocorreu após a participação do país no Projeto de Lesson Study da APEC HRDWG como parte da cooperação internacional. Em 2011, o Lesson Study foi aprimorado, reconceituado e incluído no Professional Learning Community Project nacional (em português, Projeto Comunitário de Aprendizagem Profissional). Embora, em geral, o *feedback* desses eventos mostre o grande potencial do Lesson Study contínuo como uma abordagem de desenvolvimento profissional, também havia falta de confiança entre os professores para implementar o Lesson Study por conta própria. Este artigo discute as implicações desses eventos sob o ponto de vista das necessidades da comunidade profissional de educação matemática. O texto inclui sugestões para revitalizar e manter o Lesson Study na Malásia.

Palavras-chave: Lesson Study. Desenvolvimento Profissional de Professores. Empréstimo Educacional. Comunidade Profissional.

1. Introduction

The interest of educators towards the professional development of teachers is not new as it has been commonly acknowledged that teachers' knowledge is one of the attributes to the effectiveness of education. This article focuses on one current approach, Lesson Study, which is widely used in professional development of mathematics teachers. Just as the Sakura flower is synonymous with Japan, Lesson Study too is synonymous to Japan. Lesson Study has been practiced in Japan for over 100 years, yet it was largely unknown outside of Japan. Interests in the Japanese practice of Lesson Study surfaced when comparative studies on mathematics achievements were carried out in the 1990s. Results that emerged from these studies highlighted the high mathematics achievement shown by the Japanese students (Stigler *et al.*, 1999; Stigler & Hiebert, 2004). Compared with the other countries mentioned in the study, the Japanese teachers placed more emphasis on posing problems that encouraged students to make mathematical connections rather than just using procedures. When the Japanese teachers were asked how they learnt to teach in such a manner, they attributed it to the practice of Lesson Study (Stigler & Hiebert, 1999). Through the seminal work highlighted in the *Teaching Gap*

(Stigler & Hiebert, 1999), Lesson Study soon became a trend in the professional development of mathematics teachers.

Like many developing countries, Malaysia too endeavored to raise the level of mathematics achievement of its students, as mathematics had become an essential subject for citizens to acquire and master in order for the country to progress and develop. Learning from others too, had by the turn of the century, become imperative in the era of globalization. Goods, services, people and knowledge had become much more easily transported across borders. However, there are many challenges that every country would face when borrowing and implementing new educational policies and ideas that has been proven successful in other countries. While many educational ideas such as Lesson Study, may seem universal, adopting these ideas across borders would mean implementing those very same ideas in different contexts. In order to implement new ideas like Lesson Study, there is a need to adopt and adapt these ideas so that they fit into the local context. Many issues arise when new ideas are borrowed and implemented in a new context. There is a need to consider the local culture and the teachers' beliefs and readiness to implement a new idea.

The purpose of this article is to reflect on the development of Lesson Study in Malaysia and to look at the lessons learnt in the process of its development. To provide a better understand of the context, this article begins by discussing the education system in Malaysia with special reference to the development of mathematics curriculum and consequently professional teacher development.

2. The Education System in Malaysia

2.1 Structure of Education in Malaysia

Malaysia occupies a central location in Southeast Asia, along the sea route from India to the Far East. It has a population of 32 million. It gained its independence in 1957, and being a former colony of the United Kingdom (UK), much of its government and educational structure is based on that of the UK. The structure of its educational system adopts a centralized posture where the Ministry of Education plays a central role in drafting its policies. Educational policies are made at the Ministry of Education, which includes various administrative divisions such as the School Management Division, the Curriculum Development Division, the Teacher Education Division, and the Examination Syndicates. Policies from the Ministry are then

disseminated to the State Education Departments which oversee the running of the schools in the 13 states and one Federal territory in the country. In each state, the State Education Department further administers its functions through the various District Education Offices in the state to be implemented. Other educational institutions, like the public universities, while other the ambit of the ministry, enjoys administrative autonomy in running its own programs.

2.2 Development of Professional Mathematics Teacher Development in Malaysia

In the early years of independence, much of the mathematics curriculum were borrowed and based on the British curriculum (Asiah Abu Samah, 1982). For example, the early mathematics curriculum in Malaysia in the 1960s was much influenced by the emergence of the global *New Mathematics* reforms (Karp, 2013). Obviously, as a new emerging nation having strong links with the UK, the *New Mathematics* curriculum in Malaysia was borrowed and based on projects that were developed in the UK, namely the *Scottish Mathematics Group (SMG)* and the *School Mathematics Project (SMP)* (Ghani, 1988). Aside from the international influence of the SMG and SMP, the mathematics curriculum was also much affected by local policies which were drafted in the process of national building. The *Razak Report* (Ministry of Education, 1956) and the *Rahman Talib Report* (1960) which were incorporated in Education Act of 1961, paved the way for the nationalization of educational policies. In the effort towards unifying the multiracial groups, the use of the national language in the mathematics and science curriculum was adopted. This would require teachers to move away from using the English language to the use to the national language to teach mathematics. These teething issues form the main focus of teacher development in the early years (Lee, 1982). In short, the teachers had to learn to adapt to the *New Mathematics* content as well as to use the national language as the medium of instruction at the same time.

The implementation of *New Mathematics* in the curriculum was not without criticisms. As a result of public dissatisfaction, the Cabinet Committee Report (Mahathir, 1979) voiced concern over the inability of school children to acquire the 3R's, namely reading, writing and arithmetic. This would soon lead to the next major reform of the mathematics curriculum in the 1980s which was implemented in two phases; the *Kurikulum Baru Sekolah Rendah* (New Primary School Curriculum), followed by the *Kurikulum Bersepadu Sekolah Menengah* (Integrated Secondary School Curriculum). There were several distinguishable characteristics in the reform:

1. The reform was implemented during a period of global concern that children following school programs, especially in science and mathematics, were not able to master the basic skills (Cockroft, 1982; United States National Commission on Excellence in Education, 1983).
2. Much of this concern came from the public. The Cabinet Committee was essentially a ministerial committee set up to look into the effectiveness of educational policies.
3. The revised mathematics curricula saw a greater emphasis placed on problem solving.
4. Teachers were encouraged to use remediation and enrichment through work groups.

Thus, the immediate needs of professional teacher development in the first few decades after independence can be gleaned from the historical development of the country as well as the development of the national curriculum. The main objectives of professional teacher development in the early years were thus to address the issues of the adequate supply of qualified teachers for the workforce, and to provide the teachers with curricular support programs. The supply of trained teachers was carried out through teacher preparation programs in the teacher's colleges for primary school teachers and in the universities for secondary school teachers. Not surprisingly, the use of the cascade approach was adopted to disseminate curricular changes for inservice teachers. In the cascade model, the first level of training focuses on the national-level master trainers who would conduct training for key teachers at the state or district levels who in turn would train other teachers at the school level. In this approach there is the expectancy of a cascading effect of knowledge from the Curriculum Development Division at the top of the cascade down to the teachers in schools. This approach is deemed most efficient and cost effective as it is able to train the largest number of teachers within a short period of time. However, there are two main disadvantages. First, in the cascade model of teacher professional development the amount of information and knowledge that is passed on to the teachers also diminishes by the time the training reaches the school teachers. Knowledge that is intended for transmission often ends up as a trickle by the time the training reaches the teachers. Thus, the teachers, even though they have been trained, may not have effectively internalized the new knowledge to effectively carry out the new changes in the curriculum. Second, the school teachers do not have ownership of the curricular change. The cascade model is a top-down model of training where teachers have to grapple with the ideas that were conceptualized somewhere else and then implement them in the classroom. Incorporating the teachers' own

innovations and ideas would be a challenge. Consequently, often the curricular change could not be implemented effectively, leading to the resulting gap between the intended and the implemented curriculum.

2.3 Teacher Empowerment and Action Research in Malaysia

In line with global trends in the 1990s that began to emphasize teacher empowerment, *Action Research* was first introduced in Malaysia as part of the Program for Innovation, Excellence and Research (PIER) in 1993 (Lee, 1999). The main thrust for PIER was to improve four main educational areas: Innovations in science and mathematics, small and isolated schools, distance education and educational research. The action research model that was widely adopted consists of a spiral repetition of four stages: (1) developing a plan for improvement, (2) implementing the plan, (3) observing and documenting the effects of the plan, and (4) reflecting on the effects of the plan for further planning and informed action (Kemmis & McTaggart, 1988). It has been reported that action research continues to be one of the thrusts of the Ministry of Education (MOE) with the setting up of research committees at the State Education Department and action research groups at the state level (Kim, 2005; National Institute for Educational Policy Research, 2006). At present Annual research seminars were also organized for teachers to showcase and to share the action research projects (Educational Planning and Research Division, 2007). To further improve the action research program in school the MOE suggested 1) Increasing the financial allocation for this program, 2) Introduce the management of change training for school administrators, 3) Improve monitoring mechanism, and 4) Developing training modules such as standardized training procedures and processes so that teachers who have not been given the opportunity to attend courses can use these materials for their project (National Institute for Educational Policy Research, 2006). The introduction of the ideas for teacher empowerment in the context of professional teacher development thus provides the setting for the introduction of lesson study in Malaysia.

3. Development of Lesson Study in Malaysia

By the turn of the century, the results the Trends in International Mathematics and Science Studies (TIMSS) were already widely known among teacher educators in Malaysia. Lesson Study was to a large extent less widely known at that time. However, Lesson Study was

soon to arrive at the shores of Malaysia, and this section intends to trace its development in Malaysia.

The first reported use of Lesson Study was in a small-scale research in 2004 (Lim, White & Chiew, 2005; Lim & Chiew, 2015). The purpose of the research was to explore the plausibility of using Lesson Study as an alternative teacher professional development approach to prepare student-centered activities that constituted good practice in mathematics lessons. Eight teachers in each of the two secondary schools participated. Two Lesson Study cycles were completed in one school while the other managed three Lesson Study cycles. At the end of the project, the participating teachers gave positive feedback, acknowledging that the Lesson Study approach helped promote collegial bonding among the teachers, enhanced their mathematical content knowledge as well as helping the teachers to produce better student-centered classroom activities. The positive responses from the teachers encouraged further small-scale researches that involved the collaboration between the university and the schools. An additional two schools, one primary and one secondary joined the project the following year. The encouraging response from the participating teachers and the school administrators were described as the main reasons of optimism for the continued development of Lesson Study in its initial years.

However, these initial studies also indicated that there were impediments to its implementation in Malaysian classrooms. White and Lim (2008) found certain factors that can both impede and facilitate the implementation of Lesson Study. These were 1) administrator support, 2) teacher commitment, 3) time constraints, and 4) perceptions about teaching. These constraints were consistent with the impediments to professional development programs reported elsewhere. Clarke (1994) reported several impediments to professional staff development programs. These included sustained central office support, lack of time for individual reading and reflection, commitment and ownership of proposed changes, and teachers' perception that the changes ought to be more practical.

3.1 Piloting the APEC-Tsukuba University Lesson Study Project at the Local Level

The next significant move forward in the development of Lesson Study in Malaysia was the launch of the APEC HRDWG (Asia Pacific Economic Cooperation Human Resource Development Working Group) Lesson Study Project. The APEC HRDWG adopted the Lesson Study Project for five years beginning in 2006. The Project is still ongoing with other sources of funds. The following were the areas of focus of the project from 2006 – 2010.

2006 Innovative Teaching Mathematics through Lesson Study

2007 Lesson Study focusing on Mathematical Thinking

2008 Focusing on Mathematical Communication

2009 Connection between Assessment and Subject Matter

2010 Focusing on Mathematics Textbooks, e-Textbooks and Educational Tools

The APEC HRDWG Lesson Study Project is an international cooperation project that plans to involve the member countries of APEC. The Project uses an innovative and pragmatic management approach by organizing two conferences yearly. The first yearly conference is held in the month of February in Japan and focuses on providing the invited specialists from the various APEC economies with information and knowledge that covers the area of focus for that particular year. Equipped with the knowledge the specialists from the first conference, they would return to their home countries and work on the project. Their work is then reported at the second conference, normally held in the month of September in Khon Kaen, Thailand. The project is overseen by the University of Tsukuba, Japan and Khon Kaen University, Thailand. More information and details on the APEC HRDWG Lesson Study Project is available at the Project website (<https://www.criced.tsukuba.ac.jp/math/apec/>).

The platform provided by the APEC HRDWG Lesson Study Project thus affords a greater level of cooperation offering the advantage of knowledge shared internationally. These new inputs provide new insights not only on Lesson Study but also on new ideas and standards in mathematics didactics. The participants of the project were also able to witness actual lessons in Japanese classrooms and also how Lesson Study is carried out in Japan. These new insights provide another dimension of the plausible ways teaching and learning mathematics that can be improved in the local classrooms in Malaysia.

The immediate effect of the APEC HRDWG Lesson Study Project was the initiation of a pilot project involving two local institutions, the Regional Centre for Education in Science and Mathematics (SEAMEO RECSAM) and Universiti Sains Malaysia (USM) (Cheah, 2012). Both SEAMEO RECSAM and USM had been participating the APEC HRDWG Lesson Study Project since its launch in 2006.

Six primary schools participated in the project. For each of the participating schools, three teachers together with the school administrators formed a Lesson Study group. The reason for an active involvement of the administrators was to allow them to understand how Lesson

Study is carried out, so that they may continue implementing Lesson Study in their schools after the project is completed. Each Lesson Study group also included researchers from external institutions.

The project was carried out in two phases. In the first phase, five two-hour workshops were conducted for all the participants from the six schools. Three workshops were conducted to introduce the participating teachers to the main ideas of the project, namely, Lesson Study, mathematical thinking, and communication. This was followed by two workshops on lesson planning where the participants broke up into the Lesson Study groups according to their schools. The second phase consisted of the research lessons and the post lesson discussions which were conducted in the respective schools. A final workshop session was then conducted where all the participants of the six schools came together to analyze and share the lessons they had conducted. To evaluate the responses of the participants, feedback was obtained through open-ended questionnaires which were administered at the end of each workshop. The responses from the teachers to the questionnaires were then tabulated and analyzed for emergent themes. The findings showed that:

1. The teachers perceive that mathematical thinking and communications promotes deeper student thinking, collaborative learning, student-centered lessons and further increase students' creativity.
2. After going through the Lesson Study cycle and the research lesson, the teachers commented that they have learnt about the application of mathematical thinking, various mathematics teaching activities, teaching techniques and the usefulness of Lesson Study. The conduct of Lesson Study seems to have reinforced their views about mathematical thinking, communications and Lesson Study.
3. Time constraint remains the most often quoted challenge in doing Lesson Study.
4. The teachers found that planning and carrying out relevant activities posed as major challenges for them.
5. The two main views of the teachers about the challenges were corroborated by the views they espoused concerning the types of support that the teachers need. The teachers wished for more input on mathematical thinking and communication, support from teachers and administration as well as more time.

The school administrators who participated in the project gave positive views about Lesson Study. They mentioned that Lesson Study could be used to assist especially by novice teachers to acculturate into the school system. They, however, voiced reservations related to the introduction of new innovative ideas which includes Lesson Study:

- The school curriculum was overloaded and packed, and thus finding the extra space within the present curriculum to accommodate in Lesson Study would be a challenging task.
- The other main constraints were monitoring the implementation and providing guidance to the teachers, and changing the teachers' mindset.

4. Lesson Study in the Government Transformation Program

In 2011, Lesson Study was incorporated as one of the programs in the Government Transformation Program (GTP). This provided the platform to scale up Lesson Study nationwide. Whereas, the initial of the introduction of Lesson Study in Malaysia was mainly confined to small-scale research projects, the GTP provided the opportunity to disseminate and popularize Lesson Study nationwide.

The Government Transformation Program

The results from the Trends in International Mathematics and Science Study (TIMSS) 2007 (Mullis *et al.*, 2008), showed that the results had dropped from the previous TIMSS in 2003. Around 20% of Malaysian students failed to meet minimum benchmarks for both Mathematics and Science, compared to only 5% in science and 7% in mathematics in 2003. In addition, the workforce remains relatively unskilled, with 7% educated only up to 11 years of basic education, and with only 28% of Malaysian jobs in the higher skilled bracket (PEMANDU, 2010). Thus, the Malaysian Government embarked on the GTP in 2010. This was the result of the realization that a quality education is a primary driving force to lift the quality of the nation's human capital. Enhancing education had now become not only a matter of basic human rights but an economic imperative.

Under the GTP, the performance of all public schools was assessed and ranked according to a composite score. The composite score comprised the grade point average based on the school's performance in public examinations and on the *Standards for Quality Education in Malaysia*, which measures the quality of teaching and learning, organizational management,

educational program management and student accomplishment. Schools were then assessed and ranked into seven performance bands based on their final Composite Score, with Band 1 being the highest performance band and Band 7 being the lowest performance band. Head teachers and principals of schools ranked on the lowest two bands were provided support to help them plan strategically school improvement program that fit the unique needs of their schools.

In 2011, 799 schools ranked on the lowest two bands were given support under the School Improvement Program. The school heads were then provided training in school-based leadership coaching and experiential learning programs. Further, the *Professional Learning Community* (PLC) Program was initiated in these schools to help teachers improve instruction through school-based instructional coaching and to enhance teacher collaboration. During the initial planning of the PLC program there was a strong conviction that teachers could benefit from the Japanese lesson study approach and consequently this approach was chosen to be used to support teachers of low performing classes in Band 6 and Band 7 schools. Lesson Study was subsequently incorporated into the PLC program. There were several aspects that distinguished this program from the earlier Lesson Study initiatives:

1. Lesson Study was introduced as part of a larger PLC Program that includes other teacher professional development methodologies such as learning walks, peer coaching, and teacher sharing (Bahagian Pendidikan Guru, n.d.).
2. Lesson Study in the PLC Program is now applied to other school subjects such as English language, Malay language, history, and science, besides mathematics.
3. The PLC Program facilitators includes specialists from various disciplines, whereas in the earlier initiatives, only mathematics researchers and teachers were involved.

289 schools under the School Improvement Program participated in the Lesson Study project under the PLC initiative. Six PLC workshops were conducted nationwide in 2011, involving subject teachers teaching critical subjects such as English, Mathematics, Science, History and Malay Language in their schools. Each workshop was conducted over four days. During the workshops, participants were exposed to the Japanese Lesson Study model and were shown videos on the implementation of Lesson Study practices from Japanese classrooms. They then had the opportunity to acquire hands-on experience by practicing the Lesson Study cycles in small groups under the supervision of panel experts. The panel experts were formed from a selected group of master teachers and lecturers from teacher training colleges, specializing in

the same subjects. Some of them had also been actively practicing Lesson Study either with their own students or through their involvement in Lesson Study research projects. The teachers teaching the same subject were grouped together and planned a lesson plan collaboratively. The lesson plan was carried out via micro teaching by a teacher from the group while others observed the teaching. In some of the workshops, live classroom teaching and observations were organized. The participating teachers then discussed the lessons at the end of the teaching session.

Two types of workshops were conducted; one for school coordinators and the other for school principals, state and district education officers. The workshops for the school coordinators were conducted over four days. The principals and state and district education officers participated in a one-day workshop where they were briefed about the lesson study project and the potential benefits of its implementation. The school principals and district educational officers were also required to monitor and assist where possible in the implementation of the Lesson Study cycles in their schools and within their districts respectively.

The school coordinators who had attended the workshops were required to disseminate the aim of the Lesson Study project and share their knowledge about Lesson Study with other teachers in their school community and to work collaboratively with their subject committees and implement at least two cycles of Lesson Study. They were furthermore required to choose a “difficult topic to teach” to work on collaboratively with their colleagues. During the implementation of the Lesson Study project, the national Lesson Study steering committee with the assistance of the panel experts were active in providing on-site coaching and mentoring to schools that need further support in implementing the two cycles of Lesson Study.

The teachers’ experiences in implementing Lesson Study cycles as an alternative and innovative teaching strategy was investigated, by administering a survey questionnaire at the end of the Lesson Study project. The questionnaire items were scored using a five-point Likert-scale, with the score of 1 as highly disagree to 5 as highly agree. Table 1 shows the mean scores of the teachers’ responses (Cheah & Mustapha, 2012).

The results showed that the participating teachers felt that they had acquired new knowledge in the area of subject content and pedagogical content knowledge during the project. The teachers further felt they had increased confidence about teaching the topic and had

increased ability to reflect on their teaching practice. The lowest scores among the survey items were items that described the teachers’ perception towards the implementation of Lesson Study. These items were related to whether the implementation of Lesson study was worthwhile, or enjoyable and being critiqued at the end of the Lesson Study cycle. This was an indication that the participating teachers were hesitant and less confident about the implementing the Lesson Study approach in their own classrooms.

Table 1 - *Teachers’ Experiences in Implementing Lesson Study Cycles (N=491)*

No	Items	Mean
1.	Increased knowledge about the subject content	4.26
2.	Increased pedagogical content knowledge about the subject	4.25
3.	Increased confidence about teaching the topic	4.15
4.	Increased understanding about students’ learning needs	4.00
5.	Increase ability to reflect on and improve teaching practices	4.21
6.	Increase the collegiality among members of the subject committees	4.19
7.	Involvement in the implementation of the Lesson Study cycles was worthwhile	3.82
8.	Involvement in the implementation of Lesson Study cycles was an enjoyable experience	3.96
9.	Felt comfortable of being observed and “critiqued” and the end of the Lesson Study cycle	3.47
10.	Lesson Study resulted in improved students’ engagement with the learning activities	4.01
11.	Lesson Study resulted in improved students’ interaction in the classroom	3.99

In the years that followed, the PLC initiative was extended to more schools in the country; 107 schools in 2012, 300 schools in 2013, 393 schools in 2014, and 600 schools in 2015 (Lim, *et al.*, 2018). From 2011 to 2015, a total of 1,689 schools were introduced to Lesson Study. Initially the workshops were managed by the panel experts but as the number of schools were increased, the training and monitoring of the PLC program was assigned to District Education Offices in 2015. To cope with the long-term demand, the District Education Officers would now monitor the PLC program in the district. Each District Education Office would now monitor the implementation of Lesson Study of three schools in the district. Lim *et. al* (2018) raised the concern that the sustainability of the Lesson Study in the schools would be affected as the result of the District Officers’ lack of experience and expertise on the Lesson Study process.

4. Research Incorporating the Lesson Study Approach

Since the first reported research using Lesson Study in 2006, there have been many Lesson Study related researches. Briefly, these researches can be classified into three categories. The first category involves researches that looked into the characteristics of the Lesson Study

approach and how it has promoted teacher empowerment (Cheah, 2012; Cheah & Mustapha, 2012; Chew & Lim, 2014; Chiew *et al.*, 2013; Kor *et al.*, 2019; Lim & Chiew, 2015; Lim *et al.*, 2005, 2016; Teh, 2013). The results from these studies point to the suitability and potential of using Lesson Study to empower teachers. The participating teachers also acknowledged that they acquired much content and pedagogical content knowledge through sharing with peers. Improved collegiality was another aspect that the teachers observed when participating in the research.

The second area of study involved using Lesson Study to investigate into classroom practice and classroom culture (Kor *et al.*, 2019; White & Lim, 2008). The nature of Lesson Study in using collaborative groups makes it possible for peers and researchers to enter into the classroom without creating a sense of intrusion in the research site. This allows for the entry of the researchers into the research site as participatory researchers. Researches that are less intrusive tend to afford better trustworthiness.

The third category of educational investigation involves design research. Design research methodology involves designing tasks that begin with the end-users in mind in contrast to traditional approaches that only seeks the end-users feedback after the product is complete (Zawojewski *et al.*, 2008). In Lesson Study, the teachers who are the end users of learning tasks, participate in the process of designing and discussing about the tasks, right from the beginning of the Lesson Study cycle. In using Lesson Study as a design research method, the researchers join in together with the teachers to design the tasks, observe the lesson where the teacher used the task for teaching, and finally discussed collaboratively on ways to improve the task based on the reflections for the lesson (Cheah, 2013, 2018; Chew *et al.*, 2013; Kor & Lim, 2009; Lim & Chiew, 2015). Classroom tasks that were designed using the Lesson Study process afford a spirit of confidence in its users as they had been part of the collaborative team designing, testing and improving the task together. Further, the participating teachers gained much knowledge and experience in the process. The Lesson Study approach was in fact the methodology used in the production of the Japanese textbook activities. Miyakawa (2007) explained that in-depth Lesson Study cycles were used in the design of the content and activities of the textbooks. The activities that appear in the textbooks were the result of deep discussion on the content and the significance of the activities from the mathematics education perspective. These activities were then improved through Lesson Study cycles.

5. Discussion

This section draws upon the theories of *educational borrowing* (Phillips & Ochs, 2004) and the *anthropological theory of the didactic* (ATD) (Chevallard & Sensevy, 2014; Artigue *et al.*, 2019) to guide the discussion.

5.1 Stages of Development of Lesson Study in Malaysia

The idea of borrowing educational innovations and best practices from another country and applying it to the local context is common, especially in developing and emerging economies. In examining this phenomenon of borrowing educational ideas from other countries, Phillips and Ochs (2004) observed that there are four stages in the process: (i) Stage 1 – Cross-national attraction, (ii) Stage 2 – Decision making, (iii) Stage 3 – Implementation, and (iv) Stage 4 – Internalization and ingestion (Phillips & Ochs, 2003, 2004). In the case of Lesson Study in Malaysia, Stage 1 would refer to the stage when local researchers and educators became aware of Lesson Study as an approach that had been used successfully in Japan. This awareness was as the result of literature as well as collaboration with international researchers. Research about Lesson Study had been well recorded in comparative studies of TIMSS and the TIMSS video studies, and these literatures had been well disseminated through publications (Stigler & Hiebert, 1999, 2004; Stigler *et al.*, 1999). Because of globalization, the ease of sharing and communication had been made possible. It is also worth noting that often the dissemination does not come directly from the country of origin. The first available literature about Japanese Lesson Study and the Japanese educational practices came not directly from Japan but by way of the United States (Lewis, 1995; Stigler & Hiebert, 1999), and the initial collaborative small-scale study about Japanese Lesson Study in Malaysia involved researchers from Malaysia and Australia (White & Lim, 2008). This was to be Malaysia's first initial response to the global movement of Lesson Study. The participation of Malaysia in the APEC HRDWG Lesson Study project provided further awareness and attraction to Lesson Study for its adoption in Malaysia. The initial Lesson Study researches and also the pilot study that was carried in conjunction with the APEC HRDWG Lesson Study project would constitute the beginning of Stage 2 of educational borrowing process. These studies were carried out to explore the possibility of adopting Lesson Study as a strategy that can be used in Malaysian schools. The results of these studies were encouraging and showed the potential of incorporating Lesson Study as a teacher professional development approach. Lesson Study then moved on to Stage 3, when it was

upscaled and became part of the Government Transformation Program. Subsequently, however, Lesson Study became less prominent, as it soon became conceptualized as only one out of the many strategies under the bigger umbrella of the Professional Learning Community (PLC) program. Although, the adoption of Lesson Study seems to have arrived in Stage 4 in Phillips and Ochs (2004) theoretical perspective, the challenge of sustaining Lesson Study has become more conspicuous as newer educational ideas continually appear. In the globalizing world, other novel educational ideas continue to regularly emerge, often giving the educational innovations that have already been endorsed, such as Lesson Study, little time to be internalized and ingested. Unlike in Japan, where the educators have continued to practice Lesson Study since 1945, the teachers in Malaysia have had little time to internalize the essence of Lesson Study. Since the Lesson Study Project had been implemented in 2011, there have been other projects that have been endorsed by the Ministry of Education, which include the promotion of *Science, Technology, Engineering and Mathematics* (STEM) into the curriculum, *the Literacy and Numeracy Screening* program, followed by a renewed focus on the inclusion of technology into the classroom practice. Teachers are often faced with the challenge of how they could integrate all these innovations simultaneously. This challenge was noted by the head teachers in the pilot study who had voiced that the curriculum was already crammed and that teachers would not be able to find the space to practice Lesson Study even though they thought it was a good approach to professional teacher development.

5.2 Teachers' Views of Lesson Study in Malaysia

The *anthropological theory of the didactic* (ATD) (Chevallard & Sensevy, 2014) describes the complexity of transmission and transformation of educational content as it flows through the different levels of the educational system. In ATD, the educational content refers to the educational tasks, the techniques used in relation to the tasks, and the discourse among agents involved in the task as it transcends the different levels of educational system. Because education is a human activity, the activity and the discourse are dynamic and often leads to transformations of the original ideas, resulting in differences in meanings and nuances of the ideas among the agents who are involved.

In the Lesson Study projects described earlier, the perceived meaning of the term *Lesson Study* by the various agents who were involved in the Lesson Study program in Malaysia, evolved as the Lesson Study program cascaded through the different levels of its introduction

and implementation in Malaysia. The researchers and teachers in the initial Lesson Study research studies and the Pilot Study had the benefit of observing the practice of Lesson Study in Japan through the APEC HRDWG Lesson Study Project while most of the participating teachers in the PLC program only first learned about Lesson Study in the PLC workshops they attended. One meaning commonly espoused by some of the teachers was that Lesson Study is a synonym for lesson plan. For these teachers, they believed that they have done Lesson Study once they have completed and taught the lesson plan. Some other teachers relate Lesson Study to the process of video recording the lesson. They believed lessons must be video recorded in Lesson Study. Moreover, the teachers believed that the purpose of Lesson study was to video record exemplary lessons. The emergence of these various meaning and perceptions by the teachers can be explained by the *anthropological theory of the didactic* (ATD) (Chevallard & Sensevy, 2014; Artigue *et al.*, 2019). In ATD, meanings of mathematical terms are transformed as they move across the various levels of the educational system, attributed to the complexities of discourse among the agents in the educational system. From the perspective of ATD, it is highly likely that the meaning of *Lesson Study* would be “shaped, modified, disseminated, introduced, transposed and eliminated” (Artigue *et al.*; p. 17) due to the encompassing anthropological constraints imposed at the various levels of implementation. The agents in the dissemination of Lesson Study come into the program from diverse backgrounds, playing different roles at various levels of its implementation in Malaysia. In the early stages, the researchers not only learnt about Lesson Study from literature but they also had the opportunity to learn through international cooperation, experiencing first-hand how Lesson Study is carried out in Japan and other countries. The teachers who were involved had the benefit of participating and learning in small groups through an extended period of time, enabling them to construct a more in-depth knowledge of Lesson Study. In contrast, the PLC program was conducted in a much larger group within a much shorter period of time. The workshops were normally conducted over a period of four to five days. The depth of interaction and the period over which it occurs will necessarily influence the conceptualization of ideas about Lesson Study. Moreover, the PLC program saw the involvement of specialists from different subjects besides mathematics. This would have made the presentation of Lesson Study more generic, and thus missing out on discussions related to the mathematics curriculum. Mindful that perceptions and beliefs emerge through a milieu of biographical, contextual and interactional influences (Cheah,

2001; Cocklin, 1991), these variations of conceptions of Lesson Study are perhaps not unexpected.

5.3 Sustaining and revitalizing Lesson Study in Malaysia

The various views held by the teachers who participated in the PLC program about Lesson Study, indicate that their views of Lesson Study were superficial. This was perhaps expected due to the short duration of interaction during the workshops. Although the workshops included hands-on lesson planning and real-life classroom teaching, and observations followed by discussions it would not have been intensive enough to provide the teachers with a deeper insight as to the extent Lesson Study can be used as an avenue of professional learning for them. The concern is that these superficial views of Lesson Study would result in superficial lesson planning and lesson observations, followed by discussions that are based on purely behavioral perspectives. There were little in-depth discussions which could provoke reflective thought necessary for professional development. Another implication is that their personal views could influence their perceptions of the purpose of Lesson Study. This would influence the teachers to devise personal short-term goals for implementing Lesson Study: To plan an exemplar lesson, to implement the lesson, and to critique the lesson. While these aims are aligned with the process of Lesson Study, these short-term goals are unlikely to motivate the teachers to persevere to achieve higher long-term goals as the short-term goals involve superficial targets could be achieved using less demanding approaches. On the contrary, the teachers would need to develop more significant and meaningful long-term goals in order to sustain the practice of Lesson Study.

In contrast, Lesson Study in Japan, while still based on the four-step model of lesson planning, implementing the lesson, observations and reflective discussion, is practiced with more rigor. Several features of Lesson Study in Japan comprise deeper discussions that include focus on *hatsumon* – presentation of a problem, *kikan-shido* – instruction at students' desk, *neriage* – dynamics of whole class discussion, and *matome* – summing up (Shimizu, 2007). Lesson Study in Japan is also practiced to achieve the long-term goals of developing student-centered learning and the structured problem-solving approach for teaching and learning. Thus, in Japan the Lesson Study approach is used as a means to an end, and not an end in itself; to attain the higher goal of quality mathematics didactics. In Japan, Lesson Study is used as a means of developing a culture within the community of mathematics educators. The skills,

knowledge and attitudes of the teachers are encultured within the community of professional community of mathematics educators (Baba, 2013). Lesson Study is thus a tool which is used for the purposes of developing the knowledge, skills and attitude of the professional community. Besides Japan, the Lesson Study community in Thailand has also been able to sustain the use of Lesson Study to achieve the long-term goal of accomplishing the open-ended approach in the teaching and learning of mathematics (Inprasitha, 2011). This perspective of looking at Lesson Study as part of the culture of the professional community could possibly provide indications of the way forward to sustain and revitalize the practice of Lesson Study.

The ensuing suggestions emerge through juxtaposing the development of Lesson Study in Malaysia against the backdrop of the Lesson Study in Japan and Thailand as a professional community of practice:

1. *Alignment of the long-term goals of Lesson Study to the needs of the professional community.* The long-term goals of Lesson Study should address the needs of the professional community. This is particularly essential in Malaysia as Lesson Study has been conceptualized as PLC which includes the various subjects taught in school. The goal for the mathematics community could include themes that focus on attaining the vision of teaching mathematics as embodied in the national curriculum. In Japan, the goal was to create lessons using the structured problem-solving approach, while Thailand adopted the open-ended approach. Setting the appropriate long-term goals will allow deeper discussions and consequently expand the understanding of the curriculum. In Japan, a significant amount of time in Lesson Study is spent on *kyouzai kenkyuu* – the careful study of academic content and teaching materials (Takahashi & McDougal, 2016). In the early small-scale studies and the related APEC HRDWG project in Malaysia, the clarity and relevance of the goals provided meaningful direction in the implementation of Lesson Study. However, by the time Lesson Study was upscaled in the PLC project in the GTP, there was little relevance and connection of the goals to the mathematics community. Part of the reason was that the PLC project had by now been expanded to include other subjects besides mathematics.
2. *Building and developing Lesson Study groups over a period of time.* Learning about Lesson Study through a one-week workshop allows for quick dissemination and awareness of the features of Lesson Study, but for Lesson Study to be sustained the Lesson Study groups

must be allowed time to develop and build the bonds of collegiality, attitude and trust. In the case of Malaysia, the support of the school administration is essential, as Lesson Study also entails re-scheduling lessons in order that lesson observations and discussion meetings can be conducted. The results from the early small-scale studies and the APEC HRDWG pilot study showed more teacher professional learning was attained though longer engagement in Lesson Study with the collaboration of the school administration.

3. *Emphasizing and expanding the pool of Knowledgeable Others.* In Lesson Study, the *knowledgeable other* is someone with extensive knowledge and experience either in content area or in Lesson Study (Takahashi & McDougal, 2016). In the case of Malaysia, the *knowledgeable other* sometimes play dual roles, as a content expert and also as the lead person and advisor to the Lesson Study group. This was the case in the early researches on Lesson Study and the APEC HRDWG Pilot Study where the *knowledgeable other* were the researchers. The head teachers of the schools involved, recognized the critical role played by the knowledgeable other and indicated their wish that the *knowledgeable other* could continue to extend their assistance to the school even after the end of the project. In the PLC project, the *knowledgeable others* were the master trainers in the project who had extensive experience in the teaching the relevant subjects. To sustain the Lesson Study program, it is necessary to expand the pool of *knowledgeable others* to lead in developing the professional community.
4. *Empowering teachers to participate in the decision-making process related to the Lesson Study Groups.* In envisioning the growth of Lesson Study groups as part of the wider professional community, it is necessary to incorporate shared visions into the community. Opportunities should be created where the voices of the members of the community comprising of administrators, researchers and teachers can be shared, acknowledged and taken into consideration in the decision-making process
5. *Championing Lesson Study at various levels of the professional community.* One of the essential features that has helped the development of Lesson Study in Japan was the sharing of the results at various levels of the professional community. Lesson Study is carried out in a highly structured manner at school and district levels in Japan (Takahashi & McDougal, 2016). This provides opportunities for the teachers to share their teaching ideas and materials with their peers. For Lesson Study to be sustained, the professional community

can be encouraged through various events and programs that highlight the work of the community. Lesson Study open class and other activities at school, district, state and national level can serve as platforms for knowledge, ideas and products to be shared among members of the professional community.

6. Conclusion

This article set out to trace the development of Lesson Study in Malaysia and examine the issues and challenges, and its contribution to mathematics education. Lesson Study started as small scale collaborative studies which showed its potential as a professional development approach. Malaysia's participation in the APEC HRDWG Lesson Study project further propelled Lesson Study into prominence among educators in Malaysia. Eventually, the upscaling of Lesson Study was to occur when it became part of the Government Transformation Program, which involved a reconceptualization of Lesson Study under the bigger umbrella of Professional Learning Community. Feedback from the PLC project show that while the participating teachers were confident about enhancing their subject matter knowledge and pedagogical content knowledge, they were less confident about implementing Lesson Study in their own classrooms. Evaluating the implementation of Lesson Study in Malaysia, however, would be incomplete unless it is done by taking into consideration the needs of the professional community. It is perhaps pertinent to suggest that the adoption of Lesson Study in Malaysia could hopefully be reviewed and revitalized by considering the needs and vision of the mathematics education community, particularly in the direction mathematics didactics in Malaysia should take. Clarity of this vision would then provide teachers and researchers with motivation to use Lesson Study to improve the teaching and learning of mathematics in Malaysia.

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