

The Learning study: recent trends and developments*Introduction*

Stigler and Hiebert (1999) published the book *Teaching Gap*, based on the Third International Mathematics and Science Study Video Study comparing mathematics and science teaching across different countries and analysing the lessons that the participating countries considered to be good. The results strengthened the belief that although teachers are expected to teach the same topics, what and how they teach varies by place. Furthermore, Stigler and Hiebert attributed the outstanding performance of Japanese students on various international mathematics tests to their high-quality classroom teaching, which they viewed as a positive outcome of the “Lesson study” model for sustained teacher professional development. According to Lewis (2000), “Lesson study” refers to the overall process of instructional improvement, in which teachers collaboratively plan, observe and evaluate research lessons. The key features of Lesson study are collaborative, classroom-based and practice-oriented (Murata, 2011).

The Japanese “Lesson study” was later expanded to the “Learning study” model in which the ideas of variation and learning are brought forth. Learning study is characterised by a theoretically grounded, collaborative inquiry approach that fosters student learning by developing teachers’ professional capabilities (Pang and Lo, 2012). The term “Learning study” was coined by Professor Ference Marton (cf. Marton, 2001) when he served as a distinguished visiting professor at the University of Hong Kong from 1999 to 2001. Subsequently, it has been adopted in countries all over the world.

Each Learning study focuses on a specific “object of learning”, i.e. the capabilities, skills or values that students are expected to develop. The primary focus of learning studies is to determine how students can be helped to appropriate the specific object of learning in a powerful way. During collaborative lesson planning, teachers share their disciplinary, pedagogical and pedagogical content knowledge with each other. Then they examine the students’ prior experiences and conceptions through a pre-test (sometimes together with interviews) administered to the students to define the object of learning. Finally, they work together to identify the critical aspects of the object of learning. In designing the lesson for student learning, teachers systematically and consciously rely on variation theory from phenomenography (Marton, 2015; Marton and Booth, 1997; Marton and Tsui, 2004; Marton and Pang, 2006; Pang and Ki, 2016) as the guiding framework, focusing on the critical aspect(s) to be varied and what is to remain invariant. Based on this, meaningful learning situations and different aspects of the phenomenon to be studied are introduced into the learning environment. By experiencing variations in the object of learning in the lesson design, the students learn to discern and grasp the critical aspects of the object of learning and hence develop better ways to handle them.

For each of the learning studies conducted, cycles of research lessons are observed and video-recorded. After each cycle, the implemented lessons are analysed and evaluated by the teachers, who identify possible areas for improvement. The students’ learning outcomes are then evaluated by comparing the pre- and post-test. Once the teachers have completed the research lessons with their own classes, school-based and inter-school workshops are organised, providing the opportunity for teachers to share their experiences and disseminate the outcomes of the Learning study conducted. Through collective lesson planning, trial and evaluation, teachers find new meanings and possibilities for their teaching. As its name suggests, at the core of the Learning study is “learning”, i.e. learning by students, teachers and researchers in, with



and through the research lesson. Students learn the object of learning better than they otherwise would have; teachers learn how to deal with the specific object of learning better and widen their teaching repertoire; and researchers learn whether and how the adopted theory works. The Learning study becomes “a bridge between theory and practice and between basic research and developmental work” (Pang and Marton, 2003, p. 180).

To discern the salient features of the Learning study, it is helpful to compare and contrast it with the Lesson study model. In terms of similarities, both the Learning and Lesson studies models aim to enhance teaching and learning in addition to teacher professional development. Both models are a kind of action research, emphasising the important role of teachers in both the overall study design and review of the teaching practice. Teachers deliberate and agree on the focus of the Learning/Lesson study to be undertaken and design and implement a course of action (which includes joint planning and evaluation of the research lesson). The professional activities undertaken are iterative in nature, resembling the action research cycle. Cycles of planning, implementation and evaluation are involved in both the Learning study and the Lesson study, with an improvement loop built-in so the design and implementation of the lesson can be improvised. Teacher collaboration is highlighted. Instead of individual teachers designing this innovative teaching in an isolated manner, they work together as a team to identify ways to improve the quality of their teaching and subsequently enhance the learning of their students. The professional dialogue and collaboration between the teachers is an indispensable part of both the Learning and Lesson studies. Finally, the focus of the two models is on the “lesson(s)”. Whether it is a Learning study or a Lesson study, teachers pay close attention to the improvement in the quality of the research lesson(s) through a detailed examination of the planning and actual implementation of the lesson. They study and reflect on how teaching and learning are actually done in the classroom and their relationship with learning outcomes.

In terms of differences, the most notable one is that unlike a Lesson study, a Learning study embodies a distinctive theoretical element within which the lesson’s design and implementation are grounded. Although teachers may choose to use any theories they subscribe to, most learning studies conducted thus far have been premised on variation theory. This theory suggests that to bring learning about, learners must discern and focus on the differences between a novel situation (instances, problems and tasks) and what they have experienced before. In this way, they can focus on and discern the critical aspects of situations they have not noticed or have taken for granted. To make this happen, learners must be offered the opportunity to experience and handle situations that differ only in the critical aspects concerned while all other aspects remain invariant. For instance, understanding past tense is a function of having come across at least one tense other than past tense; and relying on a certain law or principle to deal with a scientific problem is a function of distinguishing scientific problems that require different laws or principles. According to Marton and Pang (2013), “meanings are acquired from experiencing differences against a background of sameness, rather than from experiencing sameness against a background of difference” (p. 24).

In a Learning study, teachers rely on variation theory to design the research lessons and enact the joint lesson plan in the classroom. Variation theory is a powerful pedagogical tool and resource for teachers, in terms of the affordances it gives them. They can identify critical aspects of the object of learning and then design the necessary patterns of variation and invariance to help students discern and focus on the critical aspects (see Pang and Marton, 2017). Teachers are also provided with a shared “lens” through which to observe, analyse and evaluate the research lessons, and a common language to discuss and share their understanding of the research lessons (Pang, 2006).

Another distinguishing feature of the Learning study is its primary focus on the object of learning. The point of departure for a Learning study is the capability to be targeted for the research lesson, which is agreed on by the teachers involved. The rationale is that pedagogical

acts should be driven by the object of learning, i.e. the capability to be developed (Pang and Marton, 2003). Instead of putting the primary focus on teaching arrangements such as whether to adopt cooperative learning or use flipped classroom, the lesson is planned around the object of learning agreed on. The teachers try their best to identify the best possible ways to help students develop the targeted capability through the research lesson. The teaching arrangement is subordinate to achieving the object of learning identified.

Development of Learning study

The Learning study was first conceived in Hong Kong in 2000 through the “Catering for Individual Differences – Building on Variation” project (the CID(v) Project) and Pang’s (2002) PhD study, “Making learning possible: The use of variation in the teaching of school economics”. The CID(v) Project was a three-year research project (2000–2003), in which a team of researchers worked closely with two Hong Kong primary schools. The teachers involved formed the Learning study group, in which they used variation theory to plan and evaluate their instructional design to help students appropriate the agreed upon objects of learning. According to Lo *et al.* (2005), the basic premise of the project was that if teachers wanted to help students master a certain object of learning, they needed to build on the individual differences of their students. In other words, they needed to accommodate the different ways in which their students experienced the object of learning. Thus, rather than treating the students’ individual differences as an obstacle, they were treated as a useful resource that the teachers could use in their instructional design. In this project, the teachers introduced three types of variations when planning the lesson: variation in terms of students’ understanding of the object of learning (V1); variation in the teachers’ ways of dealing with the object of learning (V2); and variation as a guiding principle of pedagogical design (V3). In each of the learning studies conducted, at least two cycles of research lessons were observed and video-recorded. Thereafter, meetings were arranged for the teachers and researchers to jointly review the lessons. To evaluate the students’ learning outcomes, a pre-test and post-test was administered to the participating students. At the end of the project, seminars/workshops were organised to disseminate what was learned and achieved through the learning studies conducted.

In parallel with the CID(v) Project, in 2000, as part of his doctoral studies, Ming Fai Pang began a separate research project on the innovative idea of a Learning study. His study investigated how variation theory could be used as a resource to enhance student learning in economics through the Learning study. The research project had three aims: to enable teachers to identify an effective way to teach an economic concept that Grade 10 students found difficult (i.e. the incidence of a sales tax); to test the tenets of variation theory, which states that learning to experience something in a certain way hinges on the patterns of variation and invariance that are experienced by the learner in the critical aspects of the object of learning; and to explore how the “Learning study” approach could be used to improve teaching and learning. Unlike the CID(v) Project, this study included a comparison group (the Lesson study group). This served as a control, enabling the effectiveness of the variation theory-based instructional design developed by the Learning study group to be evaluated. Two groups of five economics teachers were involved in the study. Each group jointly developed a set of lesson plans designed to achieve an agreed object of learning: to help Grade 10 students develop the ability to understand the incidence of a sales tax (VAT) from an economics perspective (i.e. that the sharing of the tax burden between buyers and sellers depends on the relative elasticity of supply and demand). During collaborative lesson planning, one group of teachers (the comparison group), drew on their own experiences plus the findings from a pilot study on the different ways students experienced the incidence of a sales tax. The other group, the Learning study group, followed the same procedure, except they were introduced to variation theory, which they used to guide their lesson design. All of

the lessons were video-recorded and analysed. To ascertain students' learning of the concept in question, all of the students were asked to complete a written task, and five students from each class were randomly chosen for interviews. Based on the data obtained, both inter- and intra-group comparisons were made to examine the relationship between the enacted objects of learning and student learning.

As discussed above, learning studies can be carried out in two different ways, which we believe are complementary. For the Learning study that was closer to the Lesson study model, (e.g. the CID(v) project), which did not have a comparison group, a pre-experimental pre-post-test design was used. This design has often been adopted to trace the impact of the Learning study on the learning of a specific group of students before and after their research lesson(s). For the study that was closer to the design experiment (e.g. Pang's, 2002 study), a comparison group was added. This type of control variable is always introduced alongside an experimental group (in this case, the Learning study). In Pang's research, it served to examine systematically and rigorously the impact of variation theory and the Learning study on students' learning of the chosen object of learning. Regardless of the study design adopted, the important element was the teachers' collaborative lesson planning and evaluation, designed to help students better appropriate the object of learning using variation theory as the theoretical framework.

In the 20 years since its inception, over 1,000 learning studies have been conducted. Learning study has spread around the world and has been implemented in such diverse places as Beijing (e.g. Pang *et al.*, 2015), Brunei (e.g. Wood *et al.*, 2015), Canada (e.g. Tan, 2018), Hong Kong (e.g. Lo *et al.*, 2005; Pang, 2010), South Africa (e.g. Pillay and Adler, 2015), Sweden (e.g. Holmqvist *et al.*, 2012; Runesson and Gustafsson, 2012), Tanzania (e.g. Msonde, 2011) and the UK (e.g. Durden, 2018). Many learning studies have been supported and funded by the ministries of education in the countries where they have been implemented. In addition, objects of learning have been expanded into various areas, such as mathematics (e.g. Kullberg and Runesson, 2013; Martensson and Hansson, 2018), science (e.g. Lo *et al.*, 2006; Vikström *et al.*, 2013), languages (e.g. Ko, 2014; Lindström, 2017), economics and accounting (e.g. Pang and Marton, 2003; Rovio-Johansson and Lumsden, 2012), technology education (Björkholm, 2014) and practical subjects (Driver *et al.*, 2015). Some learning studies have even attempted to deal with more complex objects of learning such as democracy (Holmqvist Olander and Sandberg, 2013) and creative writing (Thorsten, 2015).

In some places, such as Hong Kong (e.g. Pang, 2006; Ko, 2011), Sweden (e.g. Van Bommel, 2012) and the UK (Davies and Dunnill, 2008), a Learning study component has been incorporated into the initial teacher education curriculum. By doing so, it is hoped that seeds are being sown in the hearts of prospective teachers, giving them a deeper understanding of the Learning study approach. At the same time, it is hoped that the Learning study component gives future teachers the capabilities and skills they need to deliver a Learning study programme and enhance their professional development. If this is achieved, it will enable them to introduce and practice the Learning study approach in the schools they will soon serve in.

Emerging themes in the special issue

The Learning study community is ever changing, and the programme is growing as an area of specialisation. In this Special Issue, some of the recent trends and developments are highlighted.

One of the visions of the Learning study is that the participating teachers will jointly create instructional products based on their experiences with the programme (e.g. Runesson *et al.*, 2018). These could be disseminated to the wider community through different channels such as school-based workshops, local, national and regional meetings, international conferences (e.g. the WALs conference) and professional and academic

journals (e.g. the IJLLS). It has been observed that an increasing number of teachers have shared their lesson plans and teaching materials with their teacher peers. They have also disseminated the findings from Learning study research undertaken in their professional practice as both teacher and researcher. In this Special Issue, two teachers, one from Hong Kong and one from Sweden, present the learning studies they have conducted in their own schools to contribute to the theoretical and professional development of the Learning study (Björk, 2019; To and Pang, 2019). We contend that to fuel the sustained development of the Learning study, it is important to promote teachers' greater participation (both as leaders and participants) in the professional and academic community, with more of their voices being heard.

Moreover, increasingly, learning studies have been dealing with objects of learning that are broader and more complex. Some scholars have criticised the Learning study's focus as being too narrow and sometimes "trivial". The huge efforts teachers and researchers must exert to deal with the "small" objects in learning studies may not be economical and worthwhile. Further, some have questioned the robustness of variation theory for enhancing student learning, because the Learning study primarily deals with very simple objects of learning. In response to these criticisms, learning studies have been attempting to extend their frontiers by introducing broader and more complex objects of learning. In this Special Issue, the Learning study reported on by Pang (2019) explores how a Learning study premised on variation theory can be used to develop students' domain-specific capabilities in the area of financial literacy. This is more generic and less well defined. Financial literacy not only deals with multiple concepts, but also emphasises the integration and synthesis of these concepts to develop a generic capability. The Learning study reported on by To and Pang (2019) follows a similar direction in which the object of learning is to develop the genre awareness of primary-five students. This is more generic and goes beyond a single concept or principle in a certain subject discipline.

Learning study has also been used as a research approach to identify and thus gain the knowledge of the critical aspects of the object of learning (e.g. Vikström *et al.*, 2013; Björkholm, 2014; Carlgren *et al.*, 2015; Lindström, 2017). By focusing on the object of learning, knowledge of the nature of a specific capability and what must be learned to develop it can be gained. Every capability consists of different components that some learners have not (yet) mastered. Thus, these components are critical to the development of the capability in question. In her article in this issue, Martensson (2019) reports on how teachers in a Learning study identified and specified the root cause of learners' difficulties by identifying what these critical aspects were. The iterative process to refine and specify the object of learning facilitated the emergence of the critical aspects of the concept underlying the learners' difficulties. Mårtensson demonstrated that as the teachers iteratively and systematically reflected on and tested different ways to handle the content together with students' learning as a point of reference, new and different knowledge of what the critical aspects actually were emerged.

A central feature of the Learning study is the importance of paying attention to variations in students' understanding of the object of learning. In this Special Issue, Ko (2019) demonstrates how this can improve teachers' assessment practices when taken seriously. She further reports on how the teachers not only shifted their focus from assessing for grading purposes to assessing to improve learning (and thus to formative assessment), but also on how they changed their instructional methods to become more student-centred.

In a previous special issue of this journal (Vol. 4 Issue 3), the theme was the role of and benefits derived from adopting an explicit theory in a lesson and Learning study. Several of the articles pointed out that theory and practical knowledge have become resources for teachers. Theory and theoretical concepts serve as critical lenses that allow practical and

formal knowledge to be synthesised (Runesson, 2015). For instance, Thorsten (2015) argued in her article that framing a Lesson study within variation theory could challenge teachers' practical knowledge because it helps them question their habits and previous experience.

In this Special Issue, Tan reports another benefit of applying an explicit theory to a Learning study. Tan's work is interesting because it breaks with the dominant use of variation theory in learning studies. In Tan's (2019) study, a group of elementary teachers were introduced to brain research theories when conducting their Learning study. Contrary to the learning studies framed within variation theory, where content is the focus, in Tan's study the teaching strategies were the focus of attention. The aim was to develop coherent teaching strategies that corresponded to theories of human cognition and how the brain works. One of the findings suggested that after having participated in the Learning study and becoming familiar with the theoretical principles of human memory and learning, the teachers developed a theoretical foundation for their pedagogical actions and could justify their decisions on theoretical grounds.

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