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Global Applications of the Japanese "Lesson Study" Teacher Education and Training Model

Abstract (Erin Duez: *Global Applications of the Japanese "Lesson Study" Teacher Education and Training Model*): "Lesson study" has been used for over a century in Japan (Makinae, 2010). However, only recently, in 1999 with the release of *The Teaching Gap* by Stigler and Hiebert, did the practice begin to spread globally (Fujii, 2013; Ebaegu & Stephens, 2013). *The Teaching Gap* is a summary of the Third International Math and Science (TIMSS) video study and included an entire chapter titled "Beyond Reform: Japan's approach to the improvement of classroom teaching." This chapter stated that the way the United States was reforming education was not systematic and offered lesson study in eight steps as a way to improve teaching and learning (Stigler & Hiebert, 1999). From 2000-2006 the lesson study process spread across the globe to nations including Indonesia, United States, England, Philippines, Australia, Sweden, and several African Nations (Groves & Doig, 2014). This paper will describe Japan's lesson study process and the successes and failures of global application.

Keywords: Lesson Study, Teacher Education, international comparison, global application

概要 (Erin Duez: 日本“课程学习”的教师培训模式在全球范围内的应用。):

“课程学习”在日本已经运用了一个多世纪 (Makinae, 2010)。然而, 直到最近, 1999 年随着 Stigler 和 Hiebert 发布的“教学差距”, 这种做法才开始在全球传播开来 (Fujii, 2013; Ebaegu & Stephens, 2013)。教学差距是第三次国际数学和科学 (TIMSS) 视频研究的一项总结, 其中包括了一整章题为“超越改革: 日本改进课堂教学的方法”。本章指出, 美国教育改革的方式在当时并没有系统化, 通过八个步骤为课程学习提供了一种改善教学和学习的方法 (Stigler & Hiebert, 1999)。从 2000 年至 2006 年, 课程研究的过程遍及全球各个国家, 包括印度尼西亚, 美国, 英国, 菲律宾, 澳大利亚, 瑞典和一些非洲国家 (Groves & Doig, 2014 年)。本文将介绍日本的课程学习的过程以及全球应用的成功与失败。

关键词: 课程学习, 教师培训, 国际比较, 全球应用

Abstract (Erin Duez: *Globale Anwendungen der „Lesson Study“ in der Ausbildung von Lehrerinnen und Lehrern*): Seit mehr als einem Jahrhundert verfolgt Japan das Lehrmodell der „Lesson Study“ (Makinae, 2010). Doch erst 1999, mit der Veröffentlichung von „The Teaching Gap“ durch Stigler und Hiebert, begann sich die Praxis weltweit zu verbreiten (Fujii, 2013; Ebaegu, & Stephens, 2013). *The Teaching Gap* ist eine Zusammenfassung der dritten internationalen Videostudie zu Mathematik und Naturwissenschaft (TIMSS) und enthält ein ganzes Kapitel mit dem Titel "Beyond Reform": Japans Ansatz zur Verbesserung des Unterrichts." In diesem Kapitel wurde festgestellt, dass die Art und Weise, wie die Vereinigten Staaten die Bildung reformierten, nicht systematisch war und daraufhin Unterrichtsstunden in acht Schritten anbot, um das Lehren und Lernen zu verbessern (Stigler & Hiebert, 1999). Von 2000-2006 verbreitete sich „Lesson Study“ über den ganzen Globus, unter anderem in Indonesien, den Vereinigten Staaten, England, den Philippinen, Australien, Schweden und mehreren afrikanischen Nationen (Groves & Doig, 2014). Dieser Artikel beschreibt Japans Unterrichtsprozess sowie Erfolge und Misserfolge der globalen Anwendung.

Schlüsselwörter: Lesson Study, Teacher Education, internationaler Vergleich, globale Anwendungen

Резюме (Эрин Дую: Глобальное применение «Lesson Study (Анализа процесса преподавания)» в подготовке учителей): Более ста лет Япония использует модель обучения в форме «Lesson Study (Анализа процесса преподавания)» (Makinae, 2010). Но лишь в 1999 году, с публикацией «The Teaching Gap» Стиглером и Хиббертом, практика начала распространяться по всему миру (Fujii, 2013; Ebaegu, & Stephens, 2013). *The Teaching Gap* является обобщением третьего международного видеоисследования по математике и естественным наукам (TIMSS) и

содержит целую главу с заголовком «Beyond Reform (За рамками реформы)»: Метод Японии для улучшения преподавания». В данной главе констатируется, что способ, которым Соединенные Штаты реформировали образование, был не систематическим и в связи с этим занятия предлагались в восемь шагов, чтобы улучшить обучение и учение (Stigler & Hiebert, 1999). С 2000 по 2006 гг. «Lesson Study (Анализ процесса преподавания)» распространился по всему земному шару, в том числе в Индонезии, Соединенных Штатах, Англии, Филиппинах, Австралии, Швеции и некоторых африканских странах (Groves & Doig, 2014). Данная статья описывает процесс обучения в Японии, а также успехи и неудачи глобального применения.

Ключевые слова: Lesson Study (Анализ процесса преподавания), Teacher Education (Подготовка учителей), международное сравнение, глобальное применение

Lesson Study in Japan

Lesson study became a formalized process in Japan in the early 20th century. However, the process of studying lessons being taught dates back even earlier to the 1870's when a Tokyo normal school had an educational lab attached so teachers could come observe and discuss findings (Sithamparam, 2015, p. 173). The process evolved from a method to create lesson plans with formal steps to one of true inquiry with a goal of continuing education through lifelong learning (Akita & Sakamoto, 2015). The collaborative culture of teaching in Japan lends itself to the lesson study process. Teaching is often viewed as a public activity and learning is part of the community rather than an individual endeavor (Fujii, 2013, p. 16). Japanese *jogyo kenkyuu* has been translated into the English "lesson study." The word *jogyo* refers to live instruction, so lesson study indicates the studying of instruction, not how to improve upon a lesson plan (Lewis, 2013). Toshiakira Fujii, Tokyo University, says that "for Japanese educators, lesson study is like air, felt everywhere because it is implemented in everyday school activities" (Fujii, 2013, p. 2). In fact 99% of elementary and 95% of secondary Japanese teachers report being involved in lesson study within the prior year (Lewis, 2013, p. 3). The goals of lesson study go beyond attempting to perfect one lesson, they include developing knowledge, beliefs, norms, and routines that improve instruction (Lewis & Perry, 2013).

Japanese lesson study occurs within four different domains in Japan: school, district, national, and outside organizations. Although lesson study cycles are very similar among the domains, the intended purpose of each varies slightly. For the local school, school educators often decide as a grade-level team the focus of the next year's lesson study during the spring of each school year based on the mission of the school (Lewis, 2013). During a school lesson study, school librarians, office staff, and school nurses all take part in the lesson study planning, observation and debrief (Akita & Sakamoto, 2015, p. 27). The Principal appoints a school supervisor for a period of two years to lead the school lesson study process (Akita & Sakamoto, 2015, p. 28). One should note that the entire lesson study process occurs during paid staff school time (Lewis, 2013). Lesson study is further structured and supported at the school level with a lesson study toolkit that includes planning and observation sheets (Akita & Sakamoto, 2015, p. 28). Lesson study has become the heart of school-based educator professional development that includes all educators from office staff to teachers to librarians; all collaborate to learn more about student learning and ultimately to better educate their students (Akita & Sakamoto, 2015; Lewis, 2013).

At the District level, educators are invited to explore topics or subject matter that interest them such as mathematics, science, social studies, music etc (Sithamparam, 2015; Lewis, 2013). The District level teams of educators meet during paid time at least once a month to conduct the lesson study process. National lesson study occurs at Japanese National Schools which are attached to Universities (Akita & Sakamoto, 2015). Often during a national lesson study, new national curriculum content and pedagogy are researched. All Japanese teachers are invited during the teaching stage to be an observer of the lesson and often hundreds attend, with the lesson being

projected in nearby auditoriums (Lewis, 2013). There are also many independent education organizations in Japan, similar to the United States, with a particular focus such as science or special education. However, lesson study plays a prominent role in their activities. For example, when they have conferences, rather than meet in a hotel for sessions, they observe lessons in local schools and meet together in the evening to discuss findings (Lewis, 2013).

Lesson study cycles in Japan span several months, some lasting an entire school year (Fujii, 2013, p. 4). Japanese teachers begin lesson study by *kyouzai kenkyuu*, studying materials for teaching. This includes examining available curriculum material, research articles, and how the lesson topic fits into the students' course of study (Takahashi & McDougal, 2015, p. 515). This important review is done by the entire team of educators involved in the lesson study and includes studying common misconceptions surrounding the topic. By doing this curriculum topic research, the team ensures that their investigative aim will generate new knowledge for their team and educational community and is not an issue that can simply be cleared up by an internet search. This topic study also allows the team to compose a lesson that utilizes the current research to better anticipate student misconceptions (Takahashi & McDougal, 2015, p. 520).

After carefully studying a topic, groups of educators formulate a question they want to investigate and long-term goals for student learning (Fujii, 2013, p. 3). The investigative question is central to the lesson study process, Fujii stated "starting lesson study without such a question would be like beginning a lesson without a lesson plan" (2013, p. 7). The lesson study group writes a lesson plan that includes anticipated student thinking, actions, and the goals for student learning. The group then selects a teacher to teach the research lesson while the rest of the group records the lesson through observation notes, videotaping, and the appreciation of student work (Lewis, 2000, p. 5). The data collected during lesson study is focused on the student actions and learning, not on the teacher (Fujii, 2013, p. 11).

After the lesson study, a discussion takes place which may last two or more hours. The discussion includes the lesson study research team and invited guests. In the case of Japanese National Schools, the public is invited to the discussion. Usually the discussion follows this agenda:

- Comments by the instructor
- Comments by the lesson study team collaborators
- Discussion
- Remarks from the Invited Commentator (Lewis, 2013, p. 12).

The discussion is focused on student learning and evidence of that learning. The discussion may be structured or unstructured, depending on team preference (Lewis, 2013, p. 12) Often in Japan, a commentator is invited to the lesson study. Their role is not to lead the lesson study but to ask questions and give insights that the internal research team might have missed. The outside commentator is often a retired Principal or a University professor (Lewis, 2013; Sithamparan, 2015)

Lesson Study in the United States

Lesson study first began to spread through the United States in 1999 (Takahashi & McDougal, 2015, p. 514). It has been implemented in various forms. Some schools tried to implement it directly as it is prescribed while many have had to adapt it to meet their system constraints, including time (Lewis, Perry, Hurd, O'Connell, 2006). While lesson study has been widely used across the United States, there are few experimental studies demonstrating its direct impact on teaching and learning nationally (Takahashi & McDougal, 2015, p. 514).

In 2013, Lewis and Perry published the results of their experimental study which demonstrated that participating in lesson study had a significant impact on teachers' and students' mathematical knowledge. This study focused on improving fraction knowledge of both students and teachers

from grades 2 through 5. Volunteer teams of educators, 39 teams total, participated in this study. The bulk of teachers were elementary teachers (87%) with the remaining being administrators and instructional coaches. Teams were randomly assigned to the experimental condition of receiving mathematical and lesson study resources with instructions to follow. Teams assigned to the control group did the same amount of professional development of their choosing. None of the 39 volunteer teams had personal contact with investigators. All data, including videos of lesson study meetings and lessons, lesson plans, written reflections, and student work was mailed to investigators for review (p. 4). At the end of the cycle, on average a 91-day period, all participants took a fractions post-test (p. 4).

The experimental group was provided with both lesson study and math resources. The lesson study resources included norm setting guidelines, outlines and explanations of the lesson study process, observation notes, and sample meeting agendas (Lewis & Perry, 2013, p.14). The math resource kit that the experimental group received provided support for studying the curriculum, the first step of lesson study. The math resource kit included research into students' challenges learning fractions, including common misconceptions among students and the focused interventions that work using a linear measurement context (p. 5-7). Teachers wrote in their reflections that by reading and discussing the math resource kit they uncovered their own misconceptions and deepened their content knowledge (p. 9). The inclusion of the math resource kit provided United States' teachers information that is often lacking in teacher manuals, including information on common student misconceptions, content knowledge, and research-backed interventions (Takahashi & McDougal, 2016, p. 514-515).

There were significant differences in pre-test and post-test scores for teachers in the experimental group but no significant difference in scores for teachers in the control group (Lewis & Perry, 2013). For example, in linear representations of fractions the experimental group teachers scored on the pre-test ($M=1.33$, $SD= 2.05$) and post-test ($M = 2.95$, $SD= 2.05$); $t(72) = 7.25$, $p < .0001$). Four other categories had similar results with a p value of less than .001, including fractions as a number, units fractions, and whole number representation. By providing elementary school teachers in the United States with a lesson study guide and math resource kit, they were able to increase their fraction content knowledge. One drawback of this study was that the experimental group had both resources, and it was not tested what would happen if they had only had one of the resources, lesson study or the math resource kit. The authors of the study feel both are necessary to achieve the results. Without the lesson study kit, the teachers would not have gained a deeper understanding of fraction instruction through planning a fraction lesson together. Without the math resource kit, they would not have been able to *kyouzai kenkyuu*, or do an adequate study of the targeted fraction curriculum.

There were also significant differences in mathematical fraction knowledge between the experimental group ($n=339$) and control group ($n=720$) with an effect size of .49, $p < .001$. (Lewis & Perry, 2017, p. 282-284). A hierarchical linear model (HLM) was utilized so that co-variables could be accounted for when analyzing effect size including the educator's fraction knowledge at pre-test, the student pre-test score, and the number of instruction hours the student received during study (p. 283-289). The effect of the teacher's lesson study participation on students' fraction knowledge was significant even without any direct coaching of teachers. Catherine and Perry used the following model, Figure 1, to explain the relationship between the lesson study cycle, teacher knowledge and student learning. One thing of note in this study was that all the teachers were volunteers and results may be different for teachers who are mandated and would not normally join a mathematics fraction study (p. 290).

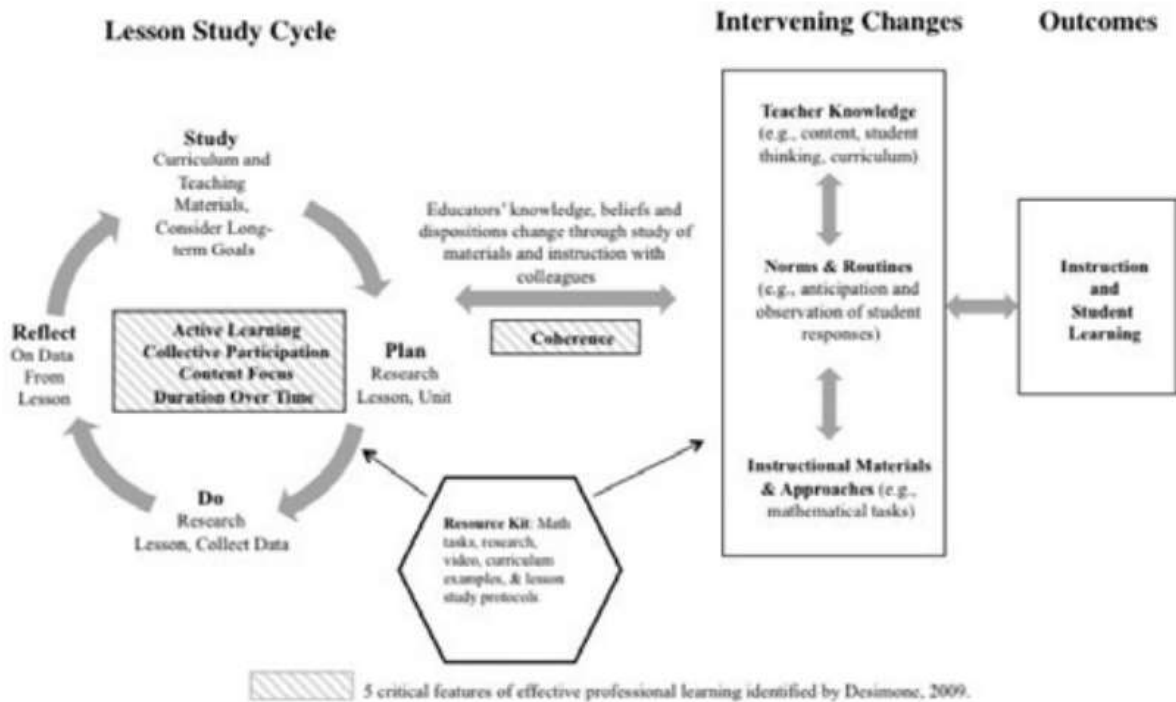


Figure 1. Model of the relationship between lesson study, changes in teacher knowledge, and student learning. (Lewis & Perry, 2014, p. 41).

At Highlands Elementary School in San Mateo, California, a five-year case study was done on the implementation of lesson study beginning in 2000 (Lewis et al., 2006). The authors noted four ways in which lesson study has evolved at the school including: lesson study became teacher learning (not simply creating a good lesson plan), lesson study depends on skilled observations and worthwhile discussions, outside sources of knowledge are useful including outside teachers and research articles, and not looking at the lesson as the finale but one step in the cycle with discussion and a follow-up inquiry (p. 271-275). Student achievement on math standardized tests increased at Highland over the course of the case study. The net increase for students at Highland compared to other schools in the district was statistically significant though other factors were not ruled out (p. 276). The authors noted that one of the significant challenges for teachers at Highland Elementary School was that their teaching manuals did not provide teachers with additional information about teaching math as compared to Japanese textbooks which are full of research-based instructional guidance and background information (p. 280).

Lesson Study in the Philippines

Several attempts have been made to establish lesson study in many Philippine schools without much success (Ebaegu & Stephens, 2013, p. 1-3). Filipino teachers and education officials have visited Japan to learn more about the process and Japanese educators have been to the Philippines to share the process (p. 2). Despite these efforts, the lesson study process may have been tried once or twice but has not had any long-term effect (p. 3). Ebaegu and Stephens, two researchers from Australia, wondered if the simple transference of the lesson study process from Japan to the Philippines was failing due to cultural differences between countries (p. 4). Educators in the

Philippines were attempting to directly copy lesson study from Japan without adapting it to Filipino culture nor preparing Filipino educators to work with a process foreign to their culture.

This study utilized Hofstede's Dimensions of Culture framework that includes the Power Distance Index (PDI), Individualism versus Collectivism (IDV-COL), Masculinity versus Femininity (MAS-FEA), the Uncertainty Avoidance Index (UAI), and Long-term versus Short-Term Orientation (LTO) (p. 10). Japan and the Philippines score very differently on these five indicators, including big differences in the Power Distance Index (PDI) and Long-term versus Short-term Orientation (LTO) (p. 12). A strong power distance dynamic indicates societal acceptance of hierarchy, here Japan had a score of 54, the Philippines a score of 94 (p. 11-13). LTO indicates whether a society has pragmatic future-oriented policies versus a short-term point of view, here Japan had a score of 80 and the Philippines a score of 19 (p. 11-13). The lesson study process requires all participants to have a voice and be respected, a very high PDI could be a barrier to the Filipinos' acceptance of this requirement. Lesson study also requires that teachers commit to long-term professional development, often with one cycle taking several months, and the long-term goals of improving educators' knowledge and beliefs (Lewis, 2013).

After the authors (Ebaegu and Stephens) had studied the overall country differences in culture, they decided to examine whether there were any differences between educators in the Philippines and Japan within Hofstede's Dimensions of Culture framework and in perceptions of good math teaching (Ebaegu & Stephens, 2013, p. 17-19). Over 200 teachers participated in answering their questionnaires, including 70 Japanese and 131 Filipino educators (p. 18). Interestingly, the largest gap between the educators was on the Individual vs. Collective (IDV) dimension with Japan at 59 and the Philippines at 47, with Filipino educators demonstrating more collectivism. However, the Filipino educators mirrored their overall Country score trends in the Power Dynamics Indicator (PDI) and Long Term Orientation (LTO) with higher scores in PDI and lower scores in LTO (p. 19) This could prove problematic for Filipino educators' adoption of lesson study if left unaddressed.

The results from the survey on what defines a good mathematics lesson were even wider apart with Japanese and Filipino teachers having very different ideas (Ebaegu & Stephens, 2013, p. 23). A strong majority of Japanese teachers indicated that having other teachers observe their classroom, identifying in advance a possible range of student responses, writing detailed lesson plans, and sharing their successful math lessons with colleagues were all important, in contrast to the Filipino educators who did not have a majority who agreed (p. 21). Both Hofstede's Dimensions of Culture and the math teaching survey data are valuable to have when proposing lesson study implementation outside Japan. By knowing that the majority of the Filipino teachers have a strong sense of hierarchy within their school, some work may need to be done so that they are comfortable with lesson study and afford equal voices to all participants. Likewise, based on the math teaching survey, it may be helpful to spend time increasing Filipino educators comfort level with visiting their colleagues' classrooms and inviting others into their rooms since they did not see that as a valuable tool. By identifying and addressing the educator needs in the Philippines the implementation of Lesson Study may be more successful.

Lesson Study in Uganda and Malawi

Similar to the Philippines and the United States, Uganda and Malawi were interested in using the lesson study process to improve student learning in their countries (Fujii, 2013). In 2011, Professor Fujii of Tokyo Gakugei University did a qualitative study on the implementation of lesson study in Uganda and Malawi (2013). Groups of educators from Uganda and Malawi, among other African nations, visit Tokyo each summer for a three-week seminar in Mathematics Education. During this visit they learn the lesson study process by observing it in Japanese schools (p. 4). They also learn the reason behind each step and ways to implement the process back in their home country (p. 4). The author (Fujii) wanted to investigate the success of lesson study implementation three years

after the educators had visited Japan (p. 5). Four research lessons and post-discussion were observed in each country. In addition to the observations, interviews were conducted of past participants of the three-week seminar in Japan.

During the lesson study observations and interviews, incorrect interpretations of Japanese lesson study became evident. In Uganda, lesson study had morphed into a workshop model with teachers arriving at a one-day clinic where they observed an instructor teach a lesson to students and debriefed it afterwards with the students (Fujii, 2013, p.7). The teachers never partook in developing the topic, studying the curriculum, forming a research question or writing the lesson plan together (p.7). Lesson study was designed to be an ongoing professional development that would continue to deepen teacher's knowledge. By conducting a clinic without teachers having a voice in developing the question to be considered, the lesson study loses its long-term benefits. In both Uganda and Malawi, teachers had a different interpretation of the lesson plan, *gakushi-shidou-an*, which translates to "learning/teaching proposal" in Japanese. Because it is thought of as a teaching proposal in Japan, instructors are encouraged to alter the lesson to respond to the needs of their students. However, in all of the lessons observed in both Uganda and Malawi the instructor attempted to follow the plan exactly, often ignoring student needs. In the post-lesson discussion, one teacher was even praised for "using his authoritative approach to push the lesson to the end" (Fujii, 2013, p. 8). Although both Uganda and Malawi educators were trained in Japan in the lesson study process, both sets of educators had difficulty implementing true lesson study (p. 14-15).

Discussion and Lessons from Global Application

Lesson study has spread all over the world with varying success and levels of implementation since it was brought to global attention in 1999 (Lewis & Perry, 2017). Although lesson study has been implemented globally, there have been few quantitative studies documenting the direct impact on student learning (Takahashi & McDougal, 2015). Lesson study is such a central part of the Japanese educational system, beginning in teacher training programs, it is difficult to find students and teachers who have not participated in lesson study, thus making quantitative studies difficult. Catherine Lewis, United States, has documented the impact lesson study has on student and teacher fraction knowledge through a randomized experimental study (Lewis & Perry, 2014). Lewis and Perry demonstrated that lesson study can have an effect on student achievement but did not analyze, as part of their research, how closely they implemented the Japanese model (Perry, 2017, Lewis & Perry, 2014).

Although lesson study has spread across the globe, its implementation has not been without difficulties. Ebaegu and Stephens studied failed attempts to establish lesson study in the Philippines and wondered if the cultural differences between Japan and Philippines prevented it from being fully implemented (Ebaegu & Stephens, 2013). Fujii spent years teaching Uganda and Malawi educators lesson study, with other Japanese professors, but then discovered that the essential parts of lesson study were not being applied in either location (Fujii, 2013). In both Uganda and Malawi, a workshop model had been adopted with teacher participants not partaking in important steps such as deciding on a research question, deciding which data to collect, and writing a joint lesson plan (Fujii, 2013). Fujii proposed a pyramid model for looking at lesson study in which educational values are at the heart of lesson study, Figure 2.

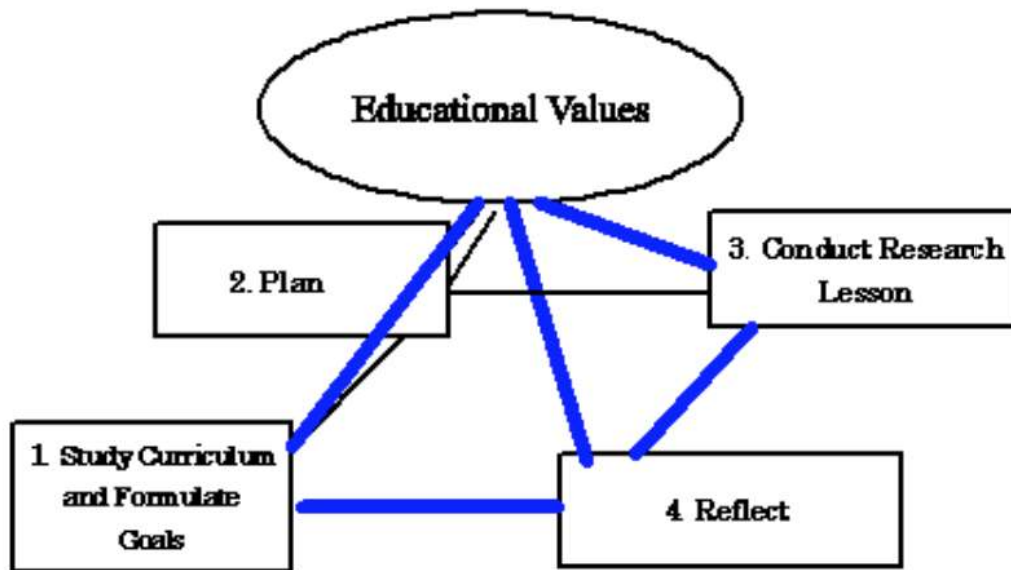


Figure 2. Pyramid model of lesson study. (Fujii, 2013).

Whether one identifies cultural or educational values differences as the main challenge in adopting and implementing Japanese lesson study, it has been widely documented that challenges do exist in its global adoption (Ebaegu & Stephens, 2013). The question becomes, when implementing Japanese lesson study abroad, is how much to adapt the Japanese lesson study model and how much does one attempt to match the Japanese education culture. Ebaegu and Stephens both discuss ways in which the culture of Japanese educators allows them more easy collaboration; does one first build trust and collaboration before attempting lesson study implementation or does one realize that a simple transference model may not work but there are still benefits to be had from the Japanese lesson study model? Lesson study will continue to be applied globally and implementers must thoughtfully analyze how much adaptation is necessary and how much that adaptation detracts from goals of lesson study.

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