

The effect of lesson study approach on developing teachers' reflective thinking as a self-assessment tool

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ABSTRACT

Lesson study approach is a professional development strategy used by teachers to improve students' learning through collaboration and continuous improvement of teaching practices. Studies have shown that implementing a lesson study can increase teacher efficacy, improve students' achievement, and positively impact school culture. The aim of the research is to examine the effect of using lesson study strategy on developing reflective thinking among teachers. The study applied an experimental design on a sample consisting of 96 (55 experimental group, 41 control group) teachers. A validated reflective thinking questionnaire was used to collect data. The results showed that there are statistically significant differences in favor of the group participated in the lesson study, with a high effect size of 0.84. The results also showed that there are no statistically significant differences attributable to teachers' experience or the educational level. The paper concludes with a set of recommendations, highlighting the significance of endorsing school-based professional development through lesson study. The adoption of this method is considered crucial in promoting reflective thinking among teachers.

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1. INTRODUCTION

The field of education has experienced significant growth in all areas. However, this development must be accompanied with participation of competent teachers in effective teaching and learning processes. To do so, teachers require proper preparation and training. Aswad [1] emphasized the importance of teacher preparation and evaluation, highlighting the gap between what is taught in training halls and what is implemented in classrooms. This gap must be addressed in professional development programs for teachers. Al-Awfi [2] pointed out that the current state of professional development for teachers in Arab countries requires more attention. With unclear policies and objectives, there is a weak focus on applied aspects, and little attention given to identifying teachers' needs.

Lesson study, a form of action research, is a school-based professional development program that originated in Japan [3]. This technique focuses on the professional development of teachers by engaging them in systematic diagnostics of their teaching practices. The underlying premise is that through collaborative lesson study, teachers can enhance their effectiveness in the classroom. The theoretical framework draws on previous studies that recommend the adoption of lesson study as a tool for professional development and highlight its successful implementation outside Japan [4]. According to Park and Son [5], lesson study should be adopted as a tool for school-based professional development in the Arab world.

Furthermore, other studies also recommend training teachers in the strategy of studying lessons [6]–[8], and others applied the lesson study approach outside Japan [9], [10].

Although, in the Kingdom of Saudi Arabia (KSA), the Ministry of Education approved the implementation of a school-based professional development project using lesson study, there is a gap between the knowledge and skills taught in teacher training programs and their implementation in classrooms. This gap needs to be addressed in professional development programs for teachers. Therefore, there is a need to improve professional development initiatives using the lesson study approach in KSA and explore effective strategies to enhance teacher effectiveness.

The objectives of this study are to examine the impact of the lesson study approach on the reflective thinking skills of teachers in the KSA. The study aims to investigate whether there are statistically significant differences in the reflective thinking skills of teachers based on their experience levels. Additionally, the research seeks to explore if there are statistically significant differences in reflective thinking skills among teachers with different educational levels. By addressing these objectives, the study will provide insights into the effectiveness of the lesson study approach in enhancing reflective thinking skills among teachers and to identify any potential variations in these skills based on experience and educational background. The study answers the research questions are: i) what is the impact of implementing lesson study on the development of reflective thinking among Saudi teachers?; and ii) are there any statistically significant differences on applying lesson study in developing reflective thinking attributable to teachers' experience or educational level?

2. LITERATURE REVIEW

The concept of lesson study, originating in Japan, has gained recognition and adoption in numerous countries worldwide. Lesson study involves a collaborative effort among educators to design, execute, monitor, and evaluate a specific lesson with the goal of enhancing student learning outcomes through the refinement of teaching techniques [11], [12]. Reflective thinking serves as a core component of lesson study, involving the retrospective analysis of personal experiences to generate new insights and understanding [13]. Within the context of lesson study, teachers employ reflective thinking to scrutinize their instructional approaches and identify opportunities for improvement [14], [15].

Reflective thinking is a form of thinking that emerges from uncertainty and confusion in real-life situations. It involves seeking clarifications based on past experiences [16]. Action research places particular emphasis on reflection as a primary tool for addressing research questions related to educational practices. The acquisition and development of reflection skills are crucial for teachers as they have a positive impact on the entire educational process. Reflecting on teaching practices contributes to a teacher's professional development [17], [18]. Several studies have underscored the significance of reflective thinking for teachers [17], [19]–[21]. Davies [22] asserts that reflective thinking in education involves anticipating situations, identifying strengths and weaknesses, recognizing logical fallacies, and making informed decisions and actions based on a realistic analysis of the situation.

Reflective thinking not only serves as a valuable tool for the professional development of educators but also as an assessment tool to evaluate teachers' learning outcomes. By engaging in reflective thinking, teachers can critically analyze their own teaching experiences and identify areas for improvement [23], [24]. Research indicates that reflective thinking can be an effective self-assessment tool in various educational contexts. A study conducted by Moon [19] found that reflective thinking helped teachers develop a deeper understanding of their own teaching processes, leading to improved academic performance.

Numerous studies have demonstrated how reflective thinking can assist teachers in enhancing their critical thinking skills and their capacity to implement theoretical concepts in practical scenarios [15], [25]–[28], [29]. Additionally, researchers have observed that reflective thinking can foster increased self-awareness and accountability among teachers regarding their teaching practices [30], [31]. Reflective thinking can be incorporated into different types of assessments, such as essays, journals, and portfolios [32]. By integrating reflective thinking into assessments, educators can encourage active student participation in their learning and foster deeper levels of comprehension.

The influence of lesson study on reflective thinking has been investigated by several scholars [33]–[38], [21]. In a meta-analysis by Demir *et al.* [21] it was found that lesson study has positive effects on teachers' professional development, including the enhancement of reflective thinking skills. Jiang *et al.* [37] examined the influence of lesson study on the reflection of mathematics teachers and found that lesson study facilitated reflective thinking among teachers. Shimizu and Kang [13] conducted a comparative study of Japanese and Korean elementary mathematics teachers and highlighted the role of reflective thinking in lesson study. They found that reflective thinking was an integral part of lesson study and contributed to professional growth. These studies provide empirical evidence of the impact of lesson study on teachers' reflective thinking.

Furthermore, studies have revealed that lesson study has positive effects on teacher practice beyond reflective thinking [12], [33]. Saito [35] demonstrated that lesson study improves teachers' content knowledge and pedagogical skills. Additionally, research suggests that lesson study can positively impact teachers' professional development by promoting reflective thinking. For example, Lewis and Perry [34] found that lesson study facilitated collaborative inquiry and reflective practice among teachers, leading to improved teaching practices and student learning outcomes. Fernandez and Yoshida [39] also found that lesson study helped teachers develop their pedagogical content knowledge and reflective skills, while promoting collaboration and shared reflection. Moreover, Takahashi and McDougal [36] pointed out that lesson study has been shown to increase teachers' self-efficacy. They found that teachers who participated in lesson study reported increased confidence in their teaching abilities through reflection and feedback from peers.

These studies collectively demonstrate the significance of lesson study and reflective thinking in improving teaching practices and enhancing student learning outcomes. Reflective thinking serves as a foundational element of lesson study, enabling teachers to critically analyze their teaching experiences, identify areas for improvement, and make informed decisions to enhance their instructional approaches. Lesson study provides a structured and collaborative platform for teachers to engage in reflective thinking, promote professional growth, and foster a culture of continuous improvement.

However, it is important to acknowledge the potential challenges and limitations associated with implementing lesson study and promoting reflective thinking. Time constraints, lack of support, and cultural barriers can hinder the widespread adoption of lesson study [33], [40]. Moreover, reflective thinking is a complex process that requires adequate training and support for teachers to effectively engage in it [17]. Addressing these challenges and providing appropriate support systems are essential for the successful implementation of lesson study and the cultivation of reflective thinking among teachers.

Lesson study provides a framework for teachers to collaboratively engage in the design, implementation, and evaluation of lessons, while reflective thinking serves as a powerful tool for teachers' professional development and instructional improvement. By incorporating reflective thinking into the lesson study process, teachers can gain valuable insights into their teaching practices, enhance their pedagogical skills, and ultimately improve student learning outcomes. Although the Ministry of Education in the Kingdom of Saudi Arabia has initiated the use of lesson study approach in its schools, there is a need to examine the effect of using lesson study strategy on developing the reflective thinking among teachers.

3. METHOD

3.1. Research design

Employing an experimental design, this study aimed to investigate specific aspects within the educational landscape. The research unfolded in the eastern province of the KSA during the academic year 2022-2023. A total of 96 teachers, representing diverse educational levels, were actively involved in the study. These educators were drawn from various primary, intermediate, and secondary schools.

3.2. Sample

A random sample of 200 teachers from 35 schools were contacted to take part in the study, 96 of them agreed to participate. Then those were assigned randomly to an experimental group (55 teachers) and a control group (41 teachers), during the academic year 2022-2023. The participants were of different teaching experience that ranged from one year to twenty-three years. They were employed at primary, intermediate, and secondary schools in Dammam, Saudi Arabia. The participants consented to participate in the study after the researcher had explained to them the purpose of the study as assured them of confidentiality of the information shared.

3.3. Instrument

To measure the reflective thinking skills of the sample, Haniyeh and Shadifat reflective thinking questionnaire [41] was used in the study with some modifications. The tool consists of five areas (meaningful knowledge, interaction with others, problem solving skills, reflective dialogue, and feedback), with eight items dedicated to each area. The participants were required to choose one of the five response options (always, often, sometimes, rarely, and never). Before implementation, the tool was presented to three experts in the field of educational assessment, and in the light of their suggestions, some adjustments were made to make the instrument more compatible with the aims of the study. The internal consistency of each of the reflective thinking scale was examined by finding the extent to which each item is related to the total degree of the area to which it belongs. The correlation coefficient between all areas and the total degree of the instrument was also obtained. The correlation coefficient for the instrument as a whole was high and statistically significant ($r=0.861$) which is acceptable [42]. Table 1 illustrates the correlation results.

Table 1. Correlation coefficients between the items of each area and the overall score

No.	Area	Correlation coefficient	Rate
1	Meaningful knowledge	0.703*	High
2	Interaction with others	0.622*	Medium
3	Problem solving skills	0.745*	High
4	Reflective dialogue	0.701*	High
5	Feedback	0.699*	High
6	All areas	0.861*	High

*Significant at 0.05

3.4. Steps for conducting lesson study approach

Following the guidelines outlined in various resources [34], [43], [44], the lesson study approach in this study unfolded through distinct stages. Additionally, other scholarly works, like Dudley [45], informed the structuring of these stages. The experimental group, serving as the focal point of the study, underwent guidance through a well-defined sequence of stages.

Setting goals: teachers were directed towards the desired goal. It is important that all aspects of lesson study, including the target lesson, are aligned with the main goal. For instance, if the research goal is to promote active learning among students, the lesson objectives should aim to achieve this goal.

Lesson planning: the teachers are instructed to focus on the objectives of the lesson and how to achieve them. This includes identifying the desired quality of knowledge, skills, and values that the teacher wants the students to acquire. The teacher should develop a lesson plan that aligns with the content of the unit being taught and connects the concepts and skills to other lessons. It is essential for the teacher to set clear expectations for student responses and choose appropriate teaching materials based on student knowledge and experiences. The teacher should also establish specific steps for teaching the material and consider how students will interact and think throughout the course. Additionally, the teacher should carefully consider the quality of questions to ask.

Teaching, observation, and lesson discussion: several weeks after planning to teach a complete study unit, which involves establishing criteria, objectives, and making preparations, teachers convene on a specific day to teach a selected lesson within the unit. A lesson study plan is created, and one teacher is nominated to note the agreed-upon basic elements. The primary focus is on how the lesson contributes to achieving the main goal of the lesson study, rather than on how well it aligns with teaching and learning objectives for students. The intention is to ensure that each teacher has a clear understanding of how the lesson relates to teaching subject standards.

Improvement (revision) and re-teaching: following the implementation of the lesson, the team and their supervisors convene to conduct a review of the lesson and reflect on the aspects that are crucial to the students. They proceed to scrutinize and evaluate the lesson based on predetermined criteria. The process of gathering information centers around three fundamental questions: i) did the students meet the lesson objectives? ii) how can the lesson be enhanced? and iii) what insights were gained from the experience? Participants share their feedback and elucidations to facilitate a comprehensive analysis and evaluation of the lesson. Subsequently, the team reconvenes to sort and analyze their findings. Based on their analysis, they identify areas to improve the lesson. The lesson study team may hold multiple meetings to refine and enhance the lesson, in preparation for implementation with a new group of students.

Reflection and sharing the results: the lesson study report holds significant value in the educational procedures as it facilitates and documents the teachers' reflections on the lesson, teaching, and learning. This acquired knowledge assists instructors in designing and improving subsequent lessons. The primary objective of creating a lesson study report is to record the reflections and discussions that occurred during the lesson study process. These reports serve as crucial parameters to distinguish between teachers' performances.

4. RESULTS AND DISCUSSION

In this study, the researcher used inferential statistics to answer the research questions. To answer the main research question: "What is the impact of implementing lesson study on the development of reflective thinking among teachers?", the independent sample t-test was used to find out the differences between the means of the group that participated in the lesson study and the group that did not participate in the lesson study. The results presented in Table 2 underscore a significant difference between the experimental and control groups in terms of enhancing teachers' teaching effectiveness through the application of reflective thinking, as evidenced by the t-test ($t_{(2,94)}=2.98$, $P<0.05$) with a substantial effect size of 0.84. The mean teaching effectiveness score for teachers engaged in the lesson study approach (Mean=4.46, SD=0.83) surpassed that of their counterparts who did not participate in the lesson study experiment (Mean=4.06, SD=0.92). According to Colquhoun's classification [46], the effect size of 0.84 falls

within the category of high impact, indicating a noteworthy influence of the lesson study approach on teaching effectiveness. The finding of a significant impact of the lesson study approach on reflective thinking aligns with Marwad's results on specialized teaching competencies. Both studies underscore the efficacy of lesson study in enhancing professional practices through reflective engagement.

This robust effect size suggests a substantial practical significance of incorporating reflective thinking through the lesson study approach. The higher mean score for the experimental group indicates a tangible improvement in teaching effectiveness, aligning with the theoretical underpinnings of reflective practices in education. These findings are consistent with prior research emphasizing the positive correlation between reflective thinking and teaching quality. The outcomes not only validate the efficacy of the lesson study approach in enhancing reflective thinking among teachers but also underscore its tangible impact on improving overall teaching effectiveness. Research by [7], [8] highlighted the lesson study approach's success in developing creative teaching skills, which complements your findings on reflective thinking, suggesting that lesson study facilitates a broad spectrum of cognitive and pedagogical enhancements. Furthermore, the results are in line with Saito [35] results that concluded that lesson study improves teachers' content knowledge and pedagogical skills, highlighting the multifaceted benefits of the approach beyond reflective thinking.

Table 2. Independent t-test results of the experimental and control groups

Variable	Group	No.	Mean	SD	df	t	Sig.	Effect size
Reflective thinking	Experimental	55	4.46	0.83	94	2.98	0.000	0.84
	Control	41	4.06	0.92				

The above results demonstrate statistically significant differences favoring the experimental group. These findings highlight the substantial impact of implementing the lesson study approach on the cultivation of reflective thinking among teachers in Dammam Province. The observed statistical significance underscores the effectiveness of this methodology in fostering the development of reflective thinking skills within the targeted group of educators. The outcomes suggest a meaningful connection between the utilization of the lesson study approach and the enhancement of reflective thinking among teachers in the specified region.

The opportunities provided by the lesson study approach contribute to the formation of good mental habits acquired by the teacher during the different stages of the lesson study cycle, such as identifying problems, searching for solutions, collecting and analyzing data, and reflecting on practices. This finding is consistent with the study of Marwad [47] which found a strong impact of a proposed training program using the reflective lesson study strategy in the development of the performance aspect of specialized teaching competencies, as well as with the study of Aal [48], which indicated the effectiveness of a program based on the study of the lesson in the development of reflective thinking skills for the teachers of the Mathematics department. It is also in line with the study of [7], [8] who found a significant impact of a proposed training program based on the lesson study approach in the development of creative teaching skills. The results also agree with Abusardaneh and Khalifa [49] study which found the school-based teachers' continuous professional development program effective in improving the classroom practices of teachers to a high degree and the study of Omar [50] which revealed a significant impact of a proposed program in environmental education based on the strategy of lesson study in the development of 21st century skills.

The second research question aimed to determine if there are statistically significant differences in applying lesson study to develop reflective thinking based on teachers' experience or educational level. The findings addressing this inquiry are encapsulated in Tables 3 and 4. These tables provide a detailed presentation of the statistical results regarding the impact of teachers' experience and educational background on the efficacy of the lesson study approach in fostering reflective thinking.

Table 3. ANOVA statistics for teachers' teaching experience

	Sum of squares	df	Mean square	F	Sig.
Between groups	9.925	2	4.963	1.887	0.157
Within groups	244.564	93	2.630		
Total	254.490	95			

Table 4. ANOVA statistics for teachers' educational level

	Sum of squares	df	Mean square	F	Sig.
Between groups	11.411	2	5.706	1.103	0.336
Within groups	481.079	93	5.173		
Total	492.490	95			

The researcher tried to find if there is statistically significant difference between the mean of the sample that participated in the lesson study group (experimental group) and the group that did not participate (control group) attributable to teachers' experience or their learners' level. One-way analysis of variance showed that there are no statistically significant differences attributable to the teachers' experience, $F_{(2,93)}=1.887$, $p=.157$. This might be due to the professional development programs provided to the teachers. This result is consistent with Tikriti and Dalabikh [51] which found that there are no statistically significant differences at the level of significance ($\alpha=0.05$) on the degree of practice of reflective thinking skills by history teachers as a whole attributed to professional experience. This result differs from the results of Al-Kubais [52] which showed that the degree of possession of reflective thinking skills by teachers of Arabic was high and found that there are statistically significant differences according to experience in favor of 10 years and more. In the same vein, one-way analysis of variance results also indicated that there are no statistically significant differences attributable to the level of the learners of the participating teachers, $F_{(2,93)}=1.103$, $p=0.336$. This result may be due to the fact that the lesson study targeted all educational stages (primary, intermediate, or secondary).

The non-significant differences associated with learners' levels indicate that the lesson study approach's effectiveness is not contingent on the educational stage, spanning primary, intermediate, and secondary levels. This versatility in application suggests the lesson study's adaptability to diverse educational settings, offering a promising avenue for fostering reflective thinking skills across a broad spectrum of teaching contexts. These findings contribute to the ongoing discussion on effective professional development strategies, emphasizing the need for context-specific considerations and highlighting lesson study as a potentially universal tool for promoting reflective practices among educators.

5. CONCLUSION

The research aimed to explore how the lesson study approach enhances reflective thinking, revealing its pivotal role in fostering positive cognitive patterns. Integrating reflective thinking into assessments proves beneficial for teachers by cultivating critical thinking skills, enhancing self-awareness, and fostering deeper learning experiences for students. Furthermore, leveraging reflective thinking in lesson study is effective for ongoing improvements in teaching practices and student learning outcomes. Lesson study, with its focus on reflective thinking, empowers teachers to take ownership of their professional growth by encouraging critical examination of practices and collaborative problem-solving. This sense of ownership motivates teachers to actively engage in reflective thinking, positively impacting their confidence and job satisfaction. Reflective thinking within lesson study prompts consideration of specific student needs, ensuring that teaching and learning experiences are tailored to diverse requirements. Additionally, lesson study promotes the formation of professional learning communities (PLCs) among teachers, fostering collaborative problem-solving and meaningful discussions. Reflective thinking acts as a catalyst for critical conversations within PLCs, nurturing a culture of continuous learning and improvement. Integrating reflective thinking into assessments allows for a more holistic evaluation of teachers' effectiveness, acknowledging the complexity of teaching and recognizing its value as an essential component of effective education.

Based on the outcomes of this study, the researchers suggest implementing several actions for future improvements. These include supporting school-based professional development through lesson study, adopting lesson study as a method of professional development for school teachers, and conducting studies on factors influencing teachers' participation in lesson study and the obstacles facing its application in schools. Additionally, research should be conducted on the effectiveness of lesson study in improving student achievement levels, and consideration should be given to teachers' gender as a factor that might influence the outcomes of the lesson study approach.

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