

Advancing Teacher Competencies through Lesson Study for Learning Community (LSC): Insights from SMP Muhammadiyah 8 Batu City

1* Eko Susetyarini, 1 Ainur Rofieq, 1 Roimil Latifa, 2 Supiana Dian Nurtjahyani

¹ Biology Education Department, Faculty of Teacher Training and Education, Universitas Muhammadiyah Malang, East Java 65144, Indonesia

² Biology Education Department, Faculty of Teacher Training and Education, Universitas PGRI Ronggolawe Tuban, East Java 62391, Indonesia

* Corresponding Author e-mail: susetyorini@umm.ac.id

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Abstract

Lesson Study for Learning Community (LSC) is a collaborative approach designed to enhance the quality of teaching and learning by addressing the professional development needs of both teachers and students. This study analyzes the cognitive understanding and practical abilities of teachers at SMP Muhammadiyah 8 Batu City (SMPM 8) in implementing LSC. The objectives include evaluating teachers' knowledge and competencies related to LSC, assessing progress in planning, conducting, and reflecting on LSC-based activities through pre-test and post-test assessments, and providing foundational insights into the effectiveness of LSC implementation for future improvement. This descriptive study, conducted from August 2023 to April 2024, involved 10 teachers actively engaged in LSC activities. Data were collected using questionnaires, observations, written tests, and document analysis and analyzed descriptively. The results indicate significant improvements in teachers' cognitive understanding and practical implementation of LSC, with average scores increasing from 58 (pre-test) to 88 (post-test). These findings underscore the effectiveness of LSC workshops in enhancing teacher competencies, particularly in collaborative planning, student engagement, and reflective practices. The study offers initial insights into teachers' knowledge of LSC, which can inform the development of targeted professional development programs. It also highlights effective strategies for scaling LSC practices to other schools and contributes to the broader understanding of LSC's impact on teacher development and learning quality, providing evidence to inform educational policy at local and district levels.

Keywords: LSC; Lesson Study; Teacher Development; Muhammadiyah; Collaborative Learning

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INTRODUCTION

Education serves as a foundation for cultivating individuals who are intellectually capable and morally sound, thereby contributing to societal development (Haleem et al., 2022; Indonesian National Commission for UNESCO, 2022; Stern, 2017). Among the myriad factors influencing educational success, teacher professionalism stands out as a pivotal element. Teacher professionalism encompasses a set of competencies, attitudes, and practices that ensure high-quality instruction. These include scientific competence in a teacher's subject area, effective

communication skills, a strong work ethic, high commitment to professional growth, and a spirit of creativity and innovation (Lisnawati, 2018; Sugiyanto et al., 2021). Teachers must not only master their subject matter but also continuously refine their pedagogical, personal, social, and professional skills to adapt to evolving educational needs. Furthermore, teacher professionalism is bolstered by principled, authoritative, and charismatic leadership, which creates an environment conducive to educational excellence (Bakar, 2018; Hartatik et al., 2022; Muna et al., 2021).

The importance of teacher professionalism is underscored by its direct impact on student learning outcomes. Research indicates that professional teachers are better equipped to manage their classrooms effectively, design engaging learning experiences, and foster student achievement. For instance, McMillan and Renzaglia (2014) highlight that effective professional development programs enable teachers to transfer newly acquired skills into their teaching practices, leading to improved student outcomes. Similarly, Budiastri et al. (2020) found that professional teachers significantly enhance student performance through structured instructional methods that promote reciprocal teacher-student relationships. These findings are corroborated by Linh and Kasule (2022), who emphasize the role of professional learning communities (PLCs) in fostering collaborative professional growth among educators, ultimately benefiting student achievement.

One of the most promising approaches for enhancing teacher professionalism is Lesson Study for Learning Community (LSC). This collaborative framework encourages teachers to work together to improve their instructional methods through a cycle of planning, observation, and reflection. LSC fosters collegiality, mutual support, and a focus on student-centered learning, making it a valuable tool for professional development and instructional improvement (Andromeda et al., 2023; Damayanti et al., 2023; Rusiyanti, Putri, et al., 2022). The LSC model is grounded in the principles of equality and shared learning, ensuring that both teachers and students benefit from a more inclusive and collaborative educational environment (Rahmi et al., 2023; Setyawan et al., 2019).

Despite its potential, the implementation of LSC in Indonesia faces several challenges. Teachers often encounter structural, cultural, and resource-related barriers that hinder their engagement with LSC practices. A significant structural challenge is the lack of institutional support and understanding of the LSC framework among school administrators and educators. Many teachers are unfamiliar with the principles and practices of LSC, leading to resistance or superficial implementation. For instance, Syarifah (2023) notes that educators often lack access to resources and institutional encouragement, which diminishes their commitment to lifelong learning and professional development. Furthermore, Setyawan et al. (2019) emphasize that without adequate guidance from school leadership, the effectiveness of LSC initiatives is severely compromised.

Cultural factors also play a critical role in the adoption of LSC. In many Indonesian schools, traditional hierarchical structures discourage open collaboration and constructive critique among teachers. Ng and Latife (2022) highlight that LSC requires a shift from individualistic teaching practices to a community-oriented approach, which can be challenging in cultures that prioritize competition over collaboration. Additionally, the emphasis on standardized testing and performance metrics often discourages teachers from experimenting with new pedagogical

approaches, as they fear that such experimentation might negatively impact student test scores (Nursyahidah & Mulyaningrum, 2022).

Resource constraints further exacerbate these challenges. Many schools lack the financial resources, time, and training opportunities needed to support LSLC implementation. Fatmawati et al. (2021) report that insufficient funding prevents schools from organizing the workshops and mentoring sessions necessary for effective LSLC adoption. Moreover, teachers' heavy workloads often leave little time for the collaborative planning, observation, and reflection activities central to LSLC (Shokri-Ghasabeh & Chileshe, 2014). These resource-related barriers have been compounded by the COVID-19 pandemic, which shifted many educational practices online. Wahyuni et al. (2021) discuss the difficulties teachers face in maintaining collaboration and communication in virtual environments, further complicating LSLC implementation.

SMP Muhammadiyah 8 Batu City (SMPM 8) provides a compelling case study for exploring the challenges and opportunities associated with LSLC. Since 2018, the school has collaborated with the Faculty of Teacher Training and Education at Universitas Muhammadiyah Malang to enhance teacher professionalism through LSLC-based interventions. These initiatives have included workshops, mentoring sessions, and collaborative teaching experiments aimed at improving instructional quality. Previous studies at SMPM 8 have documented the application of LSLC in teaching biological concepts, such as the human skeletal system (Susetyarini et al., 2019), and its broader impact on teacher development (Susetyarini et al., 2023).

While numerous studies have examined LSLC at various educational levels – ranging from elementary schools to universities – there remains a significant gap in research focusing on junior high school teachers' initial knowledge and competencies related to LSLC. Most prior research has emphasized specific aspects of LSLC, such as its application in teaching particular subjects or its role in professional learning communities (Budiyanto et al., 2021; Rusiyanti, Zulkardi, et al., 2022; Wahyuni et al., 2021). However, there is limited empirical evidence addressing the foundational knowledge and skills required for LSLC implementation, particularly in the context of junior high schools.

This study seeks to address this gap by evaluating the cognitive understanding and practical abilities of junior high school teachers at SMPM 8 Batu City in implementing LSLC. It aims to assess teachers' baseline knowledge through pre-test evaluations and measure their progress following targeted professional development interventions. By documenting these findings, the research provides valuable insights into the challenges and opportunities associated with LSLC adoption at the junior high school level.

The novelty of this study lies in its focus on the initial stages of LSLC implementation within a specific Indonesian educational context. Unlike previous research that examines LSLC on a broader scale, this study offers an in-depth analysis of its application in a real-world school environment. The findings contribute to the growing body of literature on collaborative teaching practices by highlighting the conditions necessary for successful LSLC adoption. Furthermore, the study provides actionable recommendations for designing professional development programs tailored to the needs of junior high school teachers, ensuring the sustainable implementation of LSLC.

The implications of this research extend beyond SMPM 8 Batu City. By documenting the challenges and successes of LSLC implementation, the study offers a roadmap for other schools seeking to adopt this framework. It underscores the importance of institutional support, cultural shifts toward collaboration, and adequate resources in fostering professional learning communities. Additionally, the research contributes to educational policy discussions by providing evidence-based insights into the impact of LSLC on teacher development and student learning outcomes.

This study not only fills a critical gap in the literature but also serves as a practical guide for educators and policymakers aiming to enhance teacher professionalism and instructional quality. By focusing on the context-specific application of LSLC, it lays the groundwork for future research aimed at refining and scaling this innovative approach to teacher development.

METHOD

Research Approach

This study employed a descriptive case study approach to evaluate teachers' knowledge and practices regarding the implementation of Lesson Study for Learning Community (LSLC) at SMP Muhammadiyah 8 Batu City (SMPM 8). A descriptive approach was chosen to provide a comprehensive understanding of teachers' cognitive and practical abilities, measured through pre-test and post-test assessments and observations during LSLC activities. By focusing on the nuances of teacher practices, the case study design enabled an in-depth exploration of professional development outcomes in a specific educational context. Descriptive case studies have been widely recognized for their ability to reveal complex relationships between teacher knowledge, instructional practices, and professional growth, making them particularly suitable for this research (Nielsen & Nielsen, 2021; Steele & Rogers, 2012).

The methodological choices in this study were guided by alignment with the research goals and proven efficacy in similar contexts. A descriptive case study design was selected for its ability to capture the complexities of LSLC practices within a specific educational setting (Nielsen & Nielsen, 2021; Steele & Rogers, 2012). The use of a small sample size was justified by the specialized focus of the study and the exploratory nature of the research, supported by findings from Ashraf et al. (2021) and Delfin (2023) demonstrating the value of small sample sizes in yielding meaningful insights. Additionally, the rigorous development and validation of data collection instruments ensured that the findings were robust and reflective of real-world teaching practices. By employing a comprehensive methodological framework, this study provides a detailed evaluation of LSLC implementation at SMPM 8 Batu City. The findings contribute to a deeper understanding of collaborative professional development practices and offer actionable recommendations for enhancing teacher training programs.

Time, Location, and Research Subjects

The research was conducted at SMPM 8 Batu City between August 2023 and May 2024. The school was selected as the research site due to its active engagement with LSLC initiatives through a long-standing collaboration with Universitas Muhammadiyah Malang. All teachers at SMPM 8 constituted the population of this study, and a sample of 10 teachers was purposively selected based on their active participation in LSLC activities. Although the sample size was small, it was appropriate for the

exploratory nature of this study. Research in specialized educational settings often employs small sample sizes to allow for a detailed and focused analysis of specific practices, as supported by Ashraf et al. (2021) and Klassen and Kim (2018).

Research Procedures

The research was structured in three phases: preparation, implementation, and evaluation. During the preparation phase, workshops were conducted to introduce LSLC concepts, emphasizing its core stages of planning, observation, and reflection. Instruments such as observation rubrics, pre-test and post-test questionnaires, and LSLC syntax guidelines were developed and validated to ensure their reliability and alignment with the research objectives. Validation processes, informed by prior research on assessment instruments (DeLuca et al., 2016; Rosli et al., 2021), were integral to establishing the credibility of the tools.

In the implementation phase, data collection focused on observing teachers' engagement with LSLC activities. Teacher practices were assessed during the three stages of LSLC. In the planning stage, the study examined teachers' abilities to design lesson plans and chapter outlines aligned with learning objectives. The observation phase evaluated their focus on student engagement, including individual and group interactions, as well as their ability to assess student thinking processes and group dynamics. In the reflection stage, teachers' capacities for critical analysis were assessed, including their ability to identify instructional strengths and weaknesses and propose strategies for improvement. The evaluation phase of the research relied on pre-test and post-test assessments to gauge changes in teachers' knowledge. Observation data and teacher feedback provided further context, enabling a triangulation of findings to ensure the robustness of the analysis.

Data Collection Instruments

Data collection employed a mix of qualitative and quantitative tools to capture a holistic view of teacher development. Observation rubrics were used to evaluate teachers' practices during LSLC activities, focusing on their planning, implementation, and reflection capabilities. These rubrics underwent iterative refinement to enhance their reliability, with feedback from initial pilot tests incorporated into the final design (Alamsyah et al., 2023). In addition, a specially designed LSLC syntax observation rubric captured specific elements of LSLC implementation, such as collaborative planning and student engagement strategies.

Pre-test and post-test questionnaires assessed teachers' understanding of LSLC concepts and their ability to implement them in practice. These questionnaires were developed based on validated scales, such as the Teacher Formative Assessment Practice Scale (Yan & Pastore, 2022), and were adapted to align with the LSLC framework. Observation sheets further complemented these tools by documenting real-time interactions and instructional strategies during LSLC activities.

Data Analysis

The data analysis process was primarily descriptive, focusing on identifying trends and patterns in teacher performance across pre-test and post-test assessments and observational data. Quantitative analysis was used to compare pre-test and post-test scores, highlighting knowledge gains and improvements in practical competencies. Descriptive statistics were employed to calculate mean scores and analyze trends in teacher improvement. The observational data, including detailed notes and rubric

scores, were subjected to thematic analysis to uncover recurring themes in teachers' instructional practices and reflective abilities. Teacher feedback was categorized to identify common challenges and opportunities for enhancing LSLC implementation.

The reliability and validity of the instruments were rigorously tested to ensure accurate measurement of teacher knowledge and practices. For example, inter-rater reliability was established for the observation rubrics, aligning with best practices in educational research (Begeny & Buchanan, 2010). This validation process ensured that the tools accurately reflected teachers' content knowledge and pedagogical skills, as emphasized by Ulum et al. (2023).

Ethical Statements

This study followed established ethical guidelines, with approval obtained from the institutional review board (IRB) of Universitas Muhammadiyah Malang. Participants provided informed consent after being fully briefed on the study's objectives, procedures, and voluntary nature, with the assurance of their right to withdraw at any time. All data were anonymized to protect participants' identities, and findings were reported in aggregate. The study prioritized non-maleficence by minimizing potential burdens while enhancing teachers' professional growth through LSLC workshops. Beneficence was ensured by aligning the study's goals with improvements in teaching practices and broader educational outcomes. Participants were selected equitably based on active engagement in LSLC, ensuring fair representation. Transparency and accountability were upheld through open communication, with participant feedback incorporated to maintain ethical integrity throughout the research process.

RESULTS AND DISCUSSION

Results

The results of this study reveal significant improvements in teachers' knowledge and practices related to the implementation of Lesson Study for Learning Community (LSLC) principles. The pre-test and post-test scores of workshop participants illustrate a clear upward trend in cognitive understanding and practical application, as shown in Figure 1.

The pre-test results indicate that teachers' baseline knowledge was moderate, with most participants scoring in the mid-range. Specifically, 50% of the participants scored 50, while the lowest score of 40 was recorded by 10% of teachers, reflecting limited prior understanding of LSLC. Higher pre-test scores were less common; for instance, only 10% achieved a score of 90, suggesting that substantial gaps in knowledge and application existed among the participants. This distribution underscores the need for targeted professional development to address these deficiencies.

In contrast, the post-test results show a substantial shift in performance, with many teachers achieving high scores indicative of a strong grasp of LSLC concepts. Notably, 40% of the teachers reached the maximum score of 100, while 20% scored 90, and 30% scored 80. The lowest post-test score increased to 60, representing a 20-point improvement from the lowest pre-test score. This upward trajectory in scores highlights the effectiveness of the workshops in bridging knowledge gaps and enhancing participants' understanding and implementation of LSLC.

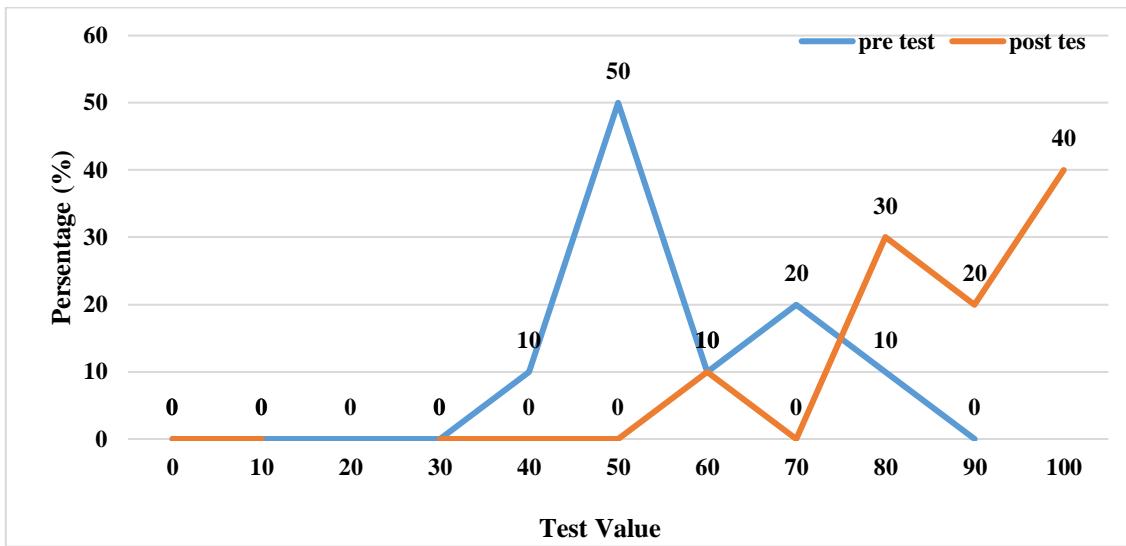


Figure 1. Comparison of the Percentage of Workshop Participants' Test Scores (Pre-test and Post-test)

The comparison of pre-test and post-test scores demonstrates the workshops' transformative impact on teacher competencies. The mean score increased from 58 to 88, signifying an average improvement of 30 points across all participants. The significant increase in the number of teachers achieving scores of 90 or above further underscores the workshop's success in promoting mastery of LSLC principles. This trend indicates not only cognitive gains but also a readiness to apply LSLC practices in real classroom settings.

A more detailed analysis of individual teacher performances, as presented in Figure 2, reveals varied levels of improvement, reflecting the personalized impact of the workshops. Teachers G, D, and E demonstrated remarkable progress, with Teacher G improving from a pre-test score of 40 to a post-test score of 100. Similarly, Teachers D and E, who scored 50 on the pre-test, also reached the maximum score of 100 on the post-test. These results suggest that the workshops effectively addressed individual learning needs, allowing participants to overcome initial challenges and achieve substantial growth.

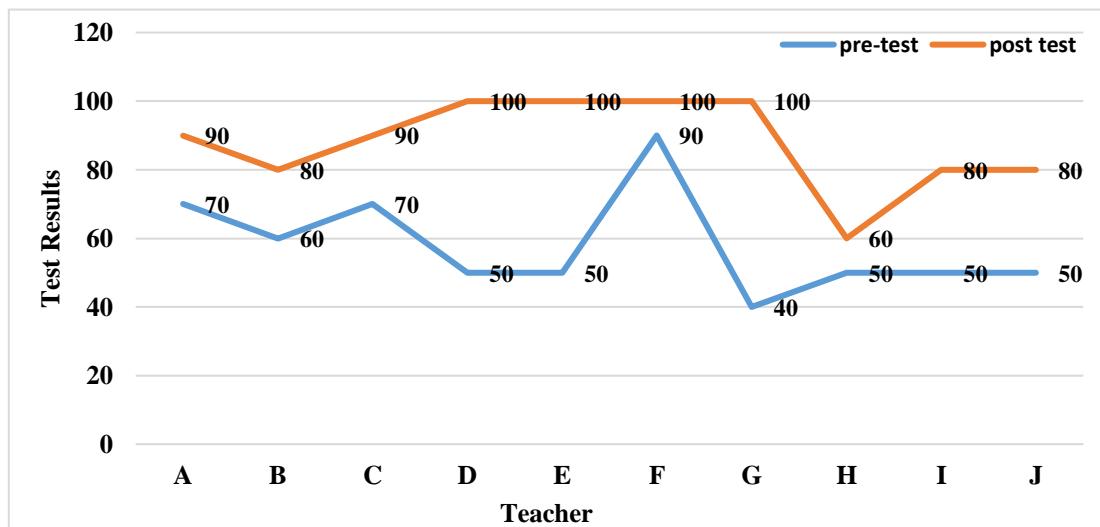


Figure 2. Workshop Participants' Test Results (Pre-test and Post-test)

The performance data also highlight cases of more modest improvement, such as Teacher H, whose score increased from 50 to 60. While this represents a less dramatic change, it still indicates progress and reflects the general trend of improvement observed across the group. The variability in individual outcomes underscores the importance of tailoring professional development programs to address diverse learning needs and prior knowledge levels.

In addition to quantitative improvements, qualitative feedback from participants reinforces the workshops' positive impact. Teachers reported increased confidence in their ability to design lesson plans, facilitate collaborative learning, and engage in reflective practices – all key components of the LSLC framework. This feedback aligns with the observed improvements in post-test scores and supports the conclusion that the workshops were effective in enhancing both cognitive understanding and practical skills.

Overall, the results demonstrate that the LSLC workshops provided participants with the tools and knowledge necessary to adopt and implement LSLC principles effectively. The marked improvements in scores, coupled with positive participant feedback, highlight the workshops' role in promoting professional growth and advancing teaching practices.

Discussion

The results of this study illustrate the significant impact of Lesson Study for Learning Community (LSLC) workshops on improving teachers' pedagogical competencies and their understanding of collaborative teaching practices. By comparing pre-test and post-test scores, it is evident that structured and targeted professional development initiatives such as LSLC workshops can effectively enhance both theoretical knowledge and practical application in real classroom settings. The quantitative and qualitative improvements observed in this study highlight the value of LSLC as a transformative professional development model.

Effectiveness of LSLC in Enhancing Teacher Knowledge

The improvement in teacher performance, as shown in Figure 1, underscores the workshops' success in bridging knowledge gaps. Before the intervention, the majority of teachers (50%) scored 50 on the pre-test, with a few teachers scoring at the extremes (40 and 90). This distribution indicates limited baseline knowledge of LSLC principles among the participants. Post-test results, however, reveal a remarkable upward shift, with 40% of participants achieving a perfect score of 100 and none scoring below 60. The mean score increased from 58 in the pre-test to 88 in the post-test, reflecting a 30-point average improvement.

The individualized progress observed in Figure 2 offers deeper insights. Teachers D and E, who both scored 50 on the pre-test, improved to the maximum score of 100, while Teacher G exhibited the most significant growth, moving from 40 to 100. These results suggest that the workshops not only provided a comprehensive understanding of LSLC concepts but also catered to individual learning needs. The mentoring component of the workshops was particularly impactful for participants with lower baseline scores, enabling them to achieve significant growth.

This level of improvement aligns with findings by Nguyen and Newton (2021), who demonstrated that targeted professional development significantly enhances teachers' knowledge and confidence in specific pedagogical areas. Similarly, Edwar et

al. (2022) highlighted the success of workshops in improving teacher professionalism and pedagogical skills. The results of this study reinforce these conclusions, illustrating how well-structured LSLC workshops can elevate teacher performance across various competency levels.

Alignment with Global LSLC Outcomes

The findings of this study resonate with international research on LSLC's adaptability and effectiveness. For instance, Norbu (2023) highlighted that classroom observations, a cornerstone of LSLC, positively influence teachers' instructional practices. Similarly, Ajani (2022) reported that Nigerian high school teachers who engaged in collaborative professional development practices like LSLC demonstrated improved teaching methodologies. These studies corroborate the results of this research, which showed significant improvements in teachers' ability to design and implement collaborative lesson plans.

The adaptability of LSLC across different educational contexts is further emphasized in studies by Kent (2017) and Hynds et al. (2011). Kent's research in South Africa highlighted how LSLC fosters interactive and engaging student roles in mathematics classrooms, while Hynds et al.'s work in New Zealand's Te Kotahitanga program demonstrated LSLC's effectiveness in enhancing culturally responsive teaching practices. These outcomes parallel the improvements observed at SMP Muhammadiyah 8 Batu City, where LSLC workshops equipped teachers with the skills to engage students actively and collaboratively.

Cahyaningrum et al. (2023) emphasized the importance of tailoring LSLC to specific educational settings, particularly in vocational education. This study mirrored that approach by designing workshops that addressed the unique instructional needs of teachers in the SMP Muhammadiyah 8 context. The success of this tailored approach demonstrates LSLC's flexibility and its potential to address diverse challenges across various educational systems.

Impact on Pedagogical Practices and Student Engagement

The workshops had a significant impact on teachers' pedagogical practices, as evidenced by their improved ability to design student-centered lesson plans and engage in reflective practices. Teachers reported increased confidence in facilitating collaborative learning environments, a key aspect of LSLC. These qualitative findings are supported by the quantitative improvements shown in Figure 1 and Figure 2, where participants demonstrated substantial growth in their cognitive understanding of LSLC principles.

Mentoring played a crucial role in this transformation. Teachers with lower baseline scores, such as Teacher G, benefited from personalized support, which enabled them to achieve mastery by the end of the training. This finding aligns with Wurdiman and Fitriasari (2020), who highlighted the importance of peer interaction and mentorship in fostering professional growth. The reflective practices emphasized during the workshops encouraged teachers to critically analyze their instructional methods, fostering a culture of continuous improvement.

The integration of reflective practices also aligns with research by Oberholzer (2019) and Suherman and Supriadi (2018), who identified reflection as a cornerstone of effective professional development. By engaging in the Plan, Do, and See stages of

LSLC, participants not only improved their teaching strategies but also developed the ability to evaluate and refine their practices iteratively.

Challenges in LSLC Implementation

Despite the success of the workshops, certain challenges emerged, particularly related to time constraints and workload pressures. Some participants found it difficult to fully engage in LSLC activities due to their existing responsibilities. These challenges are consistent with findings by Fatmawati et al. (2021) and Alharbi and Ahmad (2022), who emphasized the need for institutional support to alleviate workload burdens and facilitate effective professional development.

Addressing these challenges requires schools to allocate sufficient time and resources for LSLC activities. Administrative support is essential to create an environment where teachers can prioritize professional growth without compromising their teaching duties. Future implementations of LSLC should incorporate strategies to address these barriers, such as scheduling workshops during dedicated professional development days or providing additional resources to support collaborative planning and reflection.

Long-Term Implications and Sustainability

The sustained engagement fostered by LSLC workshops has the potential to drive long-term improvements in educational practices. Research by Rusiyanti, Putri et al. (2022) and Fuje and Tandon (2015) highlights how LSLC-based training promotes continuous improvement in teaching strategies, leading to enhanced student outcomes. This study's findings align with these conclusions, as participants not only demonstrated significant short-term gains but also reported increased confidence in sustaining collaborative teaching practices.

The broader implications of LSLC training extend beyond individual teacher development. Kugler et al. (2022) emphasized the systemic benefits of vocational training programs incorporating LSLC principles, noting improvements in student trajectories, including higher enrollment rates in tertiary education. Similarly, Sheik-Ali et al. (2020) underscored the importance of evaluating the long-term effectiveness of training programs to ensure sustained benefits. By documenting the outcomes of LSLC workshops at SMP Muhammadiyah 8, this study provides a foundation for scaling similar initiatives across other schools and regions.

The success of LSLC in this study reaffirms its relevance as a professional development model that fosters collaboration, reflection, and sustained improvement. Policymakers and educators should prioritize investments in LSLC-based programs to enhance teaching quality and student engagement at scale.

CONCLUSION

The findings of this study demonstrate a significant improvement in teachers' cognitive understanding and practical application of Lesson Study for Learning Community (LSLC) principles. This enhancement is evident in the substantial increase in post-test scores compared to pre-test scores, with the average rising from 58 to 88, and 40% of participants achieving the maximum score of 100. These results underscore the effectiveness of LSLC workshops in bridging knowledge gaps and equipping teachers with the skills needed for successful implementation of collaborative teaching practices.

The assessment of teachers' abilities to implement LSLC at SMP Muhammadiyah 8 Batu City revealed varied levels of improvement among participants. While some teachers exhibited dramatic progress, others experienced more modest gains, reflecting the importance of tailored support to address diverse starting points and learning needs. Despite these differences, the overall trend indicates a marked enhancement in both cognitive understanding and pedagogical competencies, highlighting the value of structured professional development.

These findings confirm that LSLC workshops are an effective model for fostering professional growth among educators. The results contribute to the growing evidence supporting the use of LSLC as a tool for improving teaching quality and student engagement, while also offering actionable insights for scaling such initiatives to other educational contexts. Future efforts should focus on addressing challenges such as time constraints and workload pressures to maximize the potential of LSLC as a sustainable professional development framework.

RECOMMENDATION

This research primarily examines the impact of mentoring and workshops related to Lesson Study for Learning Community (LSLC) at a single school, SMP Muhammadiyah 8 Batu City, which limits the generalizability of the findings. To build on these results, future studies should adopt a broader scope by involving multiple schools, diverse educational contexts, and a larger sample of teachers. Such an approach would enable the identification of patterns and variations in LSLC implementation, facilitating the development of best practices tailored to different teaching environments.

Further research should also explore the long-term impacts of LSLC training on both teacher competencies and student outcomes. Longitudinal studies would provide valuable insights into the sustainability of improvements observed after LSLC workshops and identify factors that influence the durability of these effects. Additionally, comparative studies across regions or countries could shed light on how contextual and cultural factors shape the effectiveness of LSLC practices, contributing to their refinement and adaptation for various educational settings.

The current findings serve as a foundation for advancing LSLC practices by highlighting the importance of mentoring, reflection, and collaborative learning in teacher professional development. Future efforts should focus on addressing challenges such as time constraints and workload pressures to ensure broader teacher participation. By doing so, LSLC can be further developed as a robust and scalable model for enhancing teaching quality and fostering professional growth in diverse educational contexts.

Author Contributions

The authors have sufficiently contributed to the study. All authors have read and agreed to the published version of the manuscript.

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Conflict of interests

The authors declare no conflict of interest.

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