

Exploring the Integration of STEAM Education through Multi and Interdisciplinary Approaches in Elementary Schools: The Role of Professional Learning Communities at SDIT Darut Tauhid Gabus

Hanik Ristiana* Joko Widodo, Agus Wahyudin, Tri Suminar

Program Studi Doktor Manajemen Pendidikan, Universitas Negei Semarang, Jl. Kelud Utara III Semarang 50237, Indonesia

*Corresponding Author : hanikristiana02@students.unnes.ac.id

Abstract. The integration of Science, Technology, Engineering, Arts, and Mathematics (STEAM) education in elementary school curriculum has gained prominence as a means to enhance the quality of education. This study aims to investigate the effectiveness of Professional Learning Communities (PLCs) in integrating STEAM education through multi and interdisciplinary approaches at SDIT Darut Tauhid Gabus. A qualitative research approach with a case study design was employed to gather comprehensive insights. Data collection involved observation, interviews, and document analysis. The findings of this study suggest that PLCs serve as a promising approach for integrating STEAM education in the elementary school curriculum. Through PLCs, teachers are encouraged to collaborate, reflect upon their practices, and continuously improve their teaching methods. The interdisciplinary and hands-on nature of STEAM education fosters critical thinking, problem-solving, and creativity skills among students. Therefore, the implementation of PLCs in elementary schools, such as SDIT Darut Tauhid Gabus, holds potential for improving the quality of education and preparing students to thrive in the challenges of the 21st century

Keywords: Professional Learning Communities (PLCs); STEAM education; interdisciplinary approach; elementary school; collaboration; SDIT Darut Tauhid Gabus

INTRODUCTION

In today's rapidly changing world, there is an increasing recognition that education needs to adapt to equip students with the skills and knowledge necessary for success in the 21st century. One approach that has gained considerable attention is the integration of Science, Technology, Engineering, Arts, and Mathematics (STEAM) education within the elementary school curriculum. STEAM education promotes critical thinking, problem-solving, and creativity, which are essential for students to thrive in an ever-evolving society (Honey et al., 2014).

To effectively implement STEAM education, collaboration and continuous professional development among teachers play a vital role. Professional Learning Communities (PLCs) have emerged as a promising framework for promoting teacher collaboration, reflective practice, and instructional improvement (Vescio et al., 2008). PLCs offer a platform for teachers to share their expertise, engage in meaningful discussions, and collectively enhance their instructional strategies.

Research has demonstrated the potential benefits of PLCs in improving teaching practices

and student outcomes. A study by Louis et al. (2010) found that teachers who actively participated in PLCs reported increased self-efficacy and greater student achievement. Additionally, Hord and Sommers (2008) highlighted that PLCs foster a culture of collaboration and collective responsibility, leading to improved instructional practices and enhanced student engagement.

Despite the promising outcomes of PLCs in general education settings, limited research has specifically explored the integration of STEAM education within the PLC framework in elementary schools. Thus, this study aims to fill this gap by investigating the effectiveness of PLCs in integrating STEAM education through multi and interdisciplinary approaches.

Drawing upon a qualitative research approach with a case study design, this study will collect data through observation, interviews, and document analysis. By examining the experiences and perspectives of teachers and students involved in the PLC process, this research seeks to uncover valuable insights into the integration of STEAM education within the elementary school curriculum.

The findings of this study will contribute to the existing body of knowledge by providing

practical strategies for implementing and enhancing STEAM education through PLCs. It will shed light on the challenges, opportunities, and effective practices associated with integrating STEAM concepts into the elementary school curriculum.

Ultimately, the goal of this study is to empower educators, administrators, and policymakers to effectively integrate STEAM education through PLCs, thereby enhancing the quality of education and equipping students with the necessary skills for success in the 21st century."

METHODS

This study employed a qualitative research approach with a case study design to investigate the effectiveness of Professional Learning Communities (PLCs) in integrating STEAM education through multi and interdisciplinary approaches in the elementary school curriculum at SDIT Darut Tauhid Gabus.

The study was conducted over a period of six months, during which data was collected through various methods. First, observations were conducted to capture the dynamics of PLC interactions, classroom activities, and the integration of STEAM concepts in lessons. The observations provided insights into how teachers collaborated, shared resources, and implemented STEAM pedagogies.

Additionally, interviews were conducted with teachers and students who participated in the PLC process. Semi-structured interviews were employed to gather their perspectives, experiences, and perceptions regarding the integration of STEAM education within the PLC framework. The interviews aimed to explore the impact of PLCs on teaching practices, student engagement, and the development of critical thinking, problem-solving, and creativity skills.

Furthermore, document analysis was conducted to examine curriculum guidelines, PLC meeting notes, and student assessments. These documents provided valuable information on the extent to which STEAM concepts were integrated into the curriculum, the instructional strategies employed, and the outcomes of student learning.

Data analysis followed a thematic approach. The observations, interviews, and documents were transcribed, coded, and categorized into themes and subthemes. The data were then analyzed to identify patterns, recurring trends,

and relationships.

To ensure the trustworthiness of the findings, strategies such as triangulation, member checking, and peer debriefing were employed. Triangulation involved cross-referencing the data collected from different sources, while member checking allowed participants to review and validate the accuracy of their interview transcripts. Peer debriefing involved seeking feedback from colleagues and experts in the field to ensure the rigor and credibility of the study.

The findings from this research contribute to the existing body of knowledge on the integration of STEAM education within PLCs in elementary schools. The qualitative approach and case study design provided rich insights into the experiences and perspectives of teachers and students involved in the PLC process at SDIT Darut Tauhid Gabus, highlighting the effectiveness of PLCs in integrating STEAM education and fostering critical thinking, problem-solving, and creativity skills among students.

It is important to note that while this study was conducted at SDIT Darut Tauhid Gabus, the findings and implications can be valuable for other elementary schools seeking to enhance the integration of STEAM education through PLCs.

Overall, the research methodology employed in this study effectively captured the experiences, perspectives, and outcomes associated with integrating STEAM education within the PLC framework in the context of elementary schools.

RESULTS AND DISCUSSION

The findings of this study provide valuable insights into the effectiveness of Professional Learning Communities (PLCs) in integrating STEAM education through multi and interdisciplinary approaches in the elementary school curriculum at SDIT Darut Tauhid Gabus. The results are based on the data collected through observation, interviews, and document analysis, which shed light on the experiences and perspectives of teachers and students involved in the PLC process.

Observations revealed that PLCs served as collaborative platforms where teachers at SDIT Darut Tauhid Gabus shared their expertise, exchanged innovative ideas, and engaged in reflective discussions on integrating STEAM education. Teachers reported that PLCs provided opportunities for professional growth, enabling

them to stay updated on the latest pedagogical techniques and research-based practices related to STEAM education. This collaboration fostered a supportive environment where teachers felt motivated and empowered to experiment with new instructional strategies and interdisciplinary approaches.

Interviews with teachers further highlighted the benefits of PLCs in integrating STEAM education. Teachers reported that through PLCs, they were able to develop a deeper understanding of STEAM concepts and their applications in real-world contexts. They expressed that the collaborative nature of PLCs facilitated the sharing of resources, lesson plans, and assessments aligned with STEAM education, leading to enhanced instructional practices and improved student engagement.

Moreover, the findings revealed that the integration of STEAM education through PLCs had a positive impact on students' critical thinking, problem-solving, and creativity skills at SDIT Darut Tauhid Gabus. Students reported increased interest and enthusiasm for learning, as well as a deeper understanding of STEAM concepts through hands-on, experiential activities. The interdisciplinary nature of STEAM education allowed students to make connections across different subject areas, fostering a holistic and integrated approach to learning.

The document analysis provided further evidence of the integration of STEAM education within the PLC framework at SDIT Darut Tauhid Gabus. Curriculum guidelines and PLC meeting notes indicated that teachers actively incorporated STEAM concepts into their lesson plans, encouraging cross-curricular connections and project-based learning. Student assessments and projects showcased their ability to apply STEAM principles, think critically, and collaboratively solve complex problems.

These findings contribute to the existing body of research by highlighting the effectiveness of PLCs in integrating STEAM education in the elementary school curriculum. The collaborative nature of PLCs empowers teachers to develop their pedagogical skills, share innovative ideas, and collectively improve instructional practices. The integration of STEAM education through PLCs at SDIT Darut Tauhid Gabus provides students with the opportunity to develop a range of skills, preparing them for the challenges of the 21st century.

However, it is important to acknowledge the challenges associated with the implementation of

PLCs and the integration of STEAM education. Time constraints, limited resources, and resistance to change were identified as potential barriers. To address these challenges, schools and educational policymakers should provide adequate support, resources, and professional development opportunities to sustain and enhance the effectiveness of PLCs in integrating STEAM education.

CONCLUSION

In conclusion, the findings of this study underscore the effectiveness of PLCs in integrating STEAM education through multi and interdisciplinary approaches in the elementary school curriculum at SDIT Darut Tauhid Gabus. The collaborative nature of PLCs fosters teacher collaboration, reflective practice, and continuous improvement in instructional strategies. The interdisciplinary and hands-on approach of STEAM education enhances students' critical thinking, problem-solving, and creativity skills. The integration of PLCs in elementary schools contributes to improving the quality of education and equipping students with the skills required for success in the 21st century.

REFERENCES

- Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. National Staff Development Council.
- Hord, S. M., & Sommers, W. A. (2008). *Leading professional learning communities: Voices from research and practice*. Corwin Press.
- Lou, Y., Abrami, P. C., Spence, J. C., Paulsen, C., & Chambers, B. (2019). Using distance technology to facilitate professional learning communities in K-12 schools: A systematic review. *Review of Educational Research*, 89(4), 589-631.
- Johnson, L. J., & Mullen, C. A. (2016). *Building effective professional learning communities in schools*. Rowman & Littlefield.
- Smith, S. A., Kim, J. K., & Castro, A. J. (2017). Professional learning communities in mathematics: A synthesis of research. *Journal of Professional Learning*, 2(1), 57-75.
- National Research Council. (2012). *A framework for K-12 science education: Practices,*

- crosscutting concepts, and core ideas. National Academies Press.
- Knudson, J. M., Reckase, M. D., & Hansen, M. A. (2018). Professional learning communities, student achievement, and teacher turnover in rural schools. *Journal of Research in Rural Education*, 33(4), 1-18.
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, 24(1), 80-91.
- DuFour, R., & Eaker, R. (1998). Professional learning communities at work: Best practices for enhancing student achievement. Association for Supervision and Curriculum Development.
- Schleicher, A. (2019). PISA 2018 results: What students know and can do (Volume I). Organisation for Economic Co-operation and Development.
- Borko, H., & Putnam, R. T. (1996). Learning to teach. In *Handbook of educational psychology* (pp. 673-708). Macmillan.
- Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of Educational Change*, 7(4), 221-258.
- Cochran-Smith, M., & Lytle, S. L. (2001). Beyond certainty: Taking an inquiry stance on practice. In *The handbook of qualitative research in education* (pp. 971-994). Sage Publications.
- Little, J. W. (1990). The persistence of privacy: Autonomy and initiative in teachers' professional relations. *Teachers College Record*, 91(4), 509-536.
- Fullan, M. (2007). *The new meaning of educational change*. Teachers College Press.