# Evaluating The Effectiveness Of The Teacher Professional Education Program (Ppg) In Strengthening Pedagogical Competence Among Certified Junior High School Teachers In Sabang City, Aceh

**[1]Desiana, [2]Samsudin, [3]Moch. Asmawi**

**Abstract**

This study aims to evaluate the effectiveness of the Teacher Professional Education Program (PPG) in strengthening pedagogical competence among certified junior high school teachers in Sabang City, Aceh Province. Specifically, the study analyzes the effectiveness of the program, identifies supporting and inhibiting factors in its implementation and examines its impact on teachers' pedagogical practices in the classroom. This study employed a mixed-methods approach using an explanatory sequential design. The quantitative phase involved 60 certified SMP teachers who had completed the PPG program, selected through purposive sampling. Data were collected using a structured questionnaire and analyzed using descriptive and inferential statistics. The qualitative phase involved in-depth interviews with 12 selected teachers and 3 school principals and the data were analyzed using thematic analysis. The findings reveal that the PPG program is generally effective in strengthening pedagogical competence as indicated by a high overall mean score (3.88) and 63% of teachers categorized at a high level of effectiveness. However, 37% of teachers remain in the moderate category, suggesting that the effectiveness of the program is not yet optimal. The program shows strong impact on teachers' ability in understanding student characteristics and instructional planning but relatively lower performance in teaching strategies and technology integration. Regression analysis indicates that the PPG program has a significant positive effect on pedagogical competence, contributing 46% to its development. Qualitative findings further reveal that while teachers demonstrate improved teaching readiness, they still face challenges in implementing innovative and technology-based learning due to limited infrastructure, uneven digital literacy, and lack of continuous professional support. In conclusion, the PPG program has successfully strengthened foundational pedagogical competence but has not fully transformed teaching practices toward student-centered and technology-enhanced learning. The effectiveness of the program is influenced by contextual factors and requires continuous professional support to ensure sustainable improvement. These findings provide important implications for policymakers and educational stakeholders in improving the implementation of teacher professional development programs, particularly in remote areas.

[1,2,3]Doctoral Program in Physical Education and Sport Science, Universitas Negeri Jakarta, Indonesia
Email: [1]desiana@mhs.unj.ac.id, [2]samsudin@unj.ac.id, [3]moch.asmawi@unj.ac.id

**Keywords:** PPG program, pedagogical competence, teacher professionalism, program evaluation, remote education.

## 1. Background Of The Study

Teacher professionalism has become one of the most critical factors in improving the quality of education in the 21st century. In many countries, including Indonesia, educational reforms have emphasized the importance of improving teacher competence as a strategic approach to enhancing student learning outcomes (Darling-Hammond et al., 2022; OECD, 2023). Teachers are not only expected to master subject matter content but also to demonstrate strong pedagogical competence, professional ethics and the ability to adapt to evolving educational demands (König et al., 2022). In this context, the Indonesian government has implemented various programs to strengthen teacher competence, one of which is the Teacher Professional Education Program (Pendidikan Profesi Guru/PPG). This program is designed to improve teacher qualifications and competencies, particularly for teachers who have already obtained certification in order to ensure sustainable professional development (Ministry of Education, Culture, Research and Technology, 2023).

The implementation of the Teacher Professional Education Program (PPG) is an integral part of the national policy for improving teacher quality. The program is regulated by the Ministry of Education, Culture, Research and Technology and is aimed at strengthening four main teacher competencies: pedagogical, professional, social, and personality competencies (Ministry of Education, Culture, Research and Technology, 2023). Among these competencies, pedagogical competence plays a central role because it directly influences the teaching and learning process in the classroom (Hattie, 2023). Pedagogical competence includes teachers' ability to understand students' characteristics, design learning strategies, implement innovative teaching methods, utilize technology in learning and conduct comprehensive assessments (König et al., 2022). Therefore, strengthening pedagogical competence through the PPG program is expected to contribute significantly to improving the quality of teaching and learning in schools.

Despite the government's continuous efforts to improve teacher competence through PPG, several studies have indicated that the effectiveness of teacher certification and professional education programs remains inconsistent. Some teachers who have completed certification programs still demonstrate limited innovation in teaching practices, lack of student-centered learning approaches and insufficient integration of technology in classroom instruction (Suryadi et al., 2023; Wulandari et al., 2024). These issues suggest that certification alone may not automatically improve pedagogical competence without continuous evaluation and monitoring of program implementation (Darling-Hammond et al., 2022). Therefore, conducting an evaluation of the PPG program is essential to assess its effectiveness in strengthening teachers' pedagogical competence, particularly among certified teachers.

The context of junior high school (SMP) education is particularly important in this discussion. At the junior secondary level, students experience significant cognitive, emotional and social development. Teachers are required to adopt appropriate pedagogical strategies that accommodate diverse learning needs and encourage active participation (OECD, 2023). Effective pedagogical competence among SMP teachers is crucial for fostering critical thinking, creativity, collaboration and communication skills among students. Consequently, strengthening pedagogical competence through professional development programs such as PPG becomes increasingly relevant and necessary.

Sabang City, located in Aceh Province presents a unique context for evaluating the implementation of the PPG program. As one of the outermost regions of Indonesia, Sabang faces various educational challenges including limited access to professional development opportunities, geographical constraints and disparities in educational resources (UNESCO, 2023). These challenges may influence the implementation and outcomes of the PPG program for teachers in the region. Therefore, evaluating the effectiveness of the PPG program in strengthening pedagogical competence among certified SMP teachers in Sabang City is important to understand how national education policies are implemented in remote or peripheral regions.

Furthermore, the transformation of education in the digital era requires teachers to integrate technology into their pedagogical practices. Teachers are expected to adopt innovative learning models such as student-centered learning, collaborative learning and project-based learning, supported by digital tools (Schleicher, 2023). However, not all teachers are equally prepared to implement these approaches, particularly in regions with limited technological infrastructure (Azmi et al., 2023). This condition reinforces the importance of evaluating whether the PPG program has effectively prepared teachers to meet the demands of 21st-century learning and digital transformation in education.

In addition, previous research on teacher certification programs in Indonesia has often focused on general teacher competence or teacher welfare, while limited studies specifically evaluate the strengthening of pedagogical competence among certified teachers after completing the PPG program, particularly in remote areas such as Sabang City (Rahman et al., 2023). This gap indicates the need for a comprehensive evaluation that examines the effectiveness of the PPG program in enhancing pedagogical competence, identifies challenges in implementation and provides recommendations for program improvement.

Moreover, evaluating the PPG program is also essential to ensure accountability and sustainability of teacher professional development initiatives. By assessing the effectiveness of the program, stakeholders such as policymakers, educational institutions and school administrators can identify strengths and weaknesses in program

implementation (OECD, 2023). The findings of this evaluation can serve as a basis for improving future teacher professional development programs and ensuring that they align with national education goals.
Based on the above considerations, this study aims to evaluate the Teacher Professional Education Program (PPG) in strengthening pedagogical competence among certified junior high school teachers in Sabang City, Aceh Province. Specifically, this study seeks to analyze the effectiveness of the program, identify supporting and inhibiting factors in its implementation and assess its impact on teachers' pedagogical practices in the classroom. The novelty of this research lies in its focus on evaluating the PPG program specifically for certified SMP teachers in an outermost region of Indonesia namely Sabang City, Aceh Province. Unlike previous studies that generally examine teacher certification or professional development programs, this study emphasizes the strengthening of pedagogical competence and explores how contextual factors such as geographical location, resource availability and technological readiness influence program outcomes.
The significance of this research is expected to contribute both theoretically and practically. Theoretically, this study enriches the body of knowledge related to teacher professional development and program evaluation in education. Practically, the findings of this study can be used by policymakers, education authorities and schools to improve the implementation of the PPG program, enhance teacher competence and ultimately improve the quality of education in Sabang City and other similar regions in Indonesia.

## 2. Literature Review

### 2.1 Teacher Professionalism and Pedagogical Competence

Teacher professionalism has become a central issue in improving educational quality in the 21st century. Professional teachers are expected to master four core competencies: pedagogical, professional, social and personal competencies (Ministry of Education, Culture, Research and Technology, 2023). Among these, pedagogical competence is considered the most critical because it directly influences teaching and learning processes in the classroom (Darling-Hammond et al., 2022).
Pedagogical competence refers to teachers' ability to understand students' characteristics, design effective instructional strategies, implement appropriate teaching methods and conduct comprehensive assessments (König et al., 2022). In the context of 21st-century education, pedagogical competence also includes the integration of digital technology and innovative teaching approaches such as student-centered learning and project-based learning (Schleicher, 2023).
Recent studies highlight that teachers with strong pedagogical competence are more capable of creating interactive and meaningful learning environments which significantly improve student learning outcomes (Hattie, 2023). Conversely, limited pedagogical competence often results in teacher-centered instruction and low student engagement, emphasizing the need for continuous professional development (OECD, 2023).

### 2.2 Teacher Professional Education Program (PPG) in Indonesia

The Teacher Professional Education Program (Pendidikan Profesi Guru/PPG) is a national policy initiative aimed at improving teacher quality and professionalism in Indonesia. The program is designed to bridge the gap between theoretical knowledge and practical teaching skills through structured training, teaching practicum and competency assessments (Ministry of Education, Culture, Research and Technology, 2023).
Recent research indicates that the PPG program has contributed positively to improving teacher competence, particularly in pedagogical skills and instructional practices (Suryadi et al., 2023). A study by Pratama and Widodo (2024) found that teachers who completed the PPG program demonstrated better lesson planning, classroom management and assessment strategies compared to those who had not participated in the program.
Furthermore, the PPG program emphasizes the development of four core competencies with a particular focus on pedagogical competence. According to Rahman et al. (2023), the integration of coursework and field experience in PPG enhances teachers' readiness to implement effective teaching practices. However, the effectiveness of the program depends on the quality of its implementation and institutional support.

### 2.3 PPG and the Development of Pedagogical Competence

A growing body of literature has examined the role of the PPG program in strengthening pedagogical competence. Studies show that PPG participants experience significant improvements in instructional planning, teaching strategies and student assessment (Fitriani et al., 2023).
In addition, recent research highlights the importance of integrating Technological Pedagogical Content Knowledge (TPACK) within the PPG framework. The integration of TPACK has been shown to enhance teachers' ability to use digital tools effectively in teaching and learning processes (Mishra & Koehler, 2023; Chai et al., 2024). This is particularly relevant in the digital era where teachers are expected to facilitate technology-supported learning environments.
However, some studies indicate that improvements in pedagogical competence are not always consistent. For example, Wulandari et al. (2024) found that some certified teachers still rely on traditional teaching methods and show limited innovation in classroom practices. This suggests that participation in PPG alone may not guarantee sustained improvement in pedagogical competence without continuous professional support.

### 2.4 Challenges in the Implementation of PPG

Despite its potential benefits, the implementation of the PPG program faces several challenges. One of the main issues is the disparity in access to resources and training facilities, particularly in remote and underdeveloped regions (UNESCO, 2023). Geographical constraints and limited technological infrastructure can hinder the effectiveness of teacher training programs. According to Azmi et al. (2023), teachers in remote areas often face difficulties in accessing digital learning resources and participating in professional development activities. This condition affects their ability to fully benefit from programs such as PPG.

Another challenge is the lack of continuous mentoring and evaluation after program completion. Research shows that professional development programs are more effective when supported by ongoing coaching and reflective practice (Darling-Hammond et al., 2022). Without such support, teachers may not significantly change their instructional practices despite completing certification programs.

### 2.5 Research Gap and Contribution of the Study

Previous studies on the PPG program in Indonesia have primarily focused on general teacher competence, program implementation or teacher welfare (Suryadi et al., 2023; Rahman et al., 2023). However, limited research specifically evaluates the effectiveness of the PPG program in strengthening pedagogical competence among certified teachers.

Moreover, most existing studies do not adequately consider contextual factors such as geographical location, resource availability and technological readiness. Research conducted by UNESCO (2023) emphasizes that educational program effectiveness often varies across regions, particularly between urban and remote areas.

Therefore, this study aims to fill this gap by evaluating the effectiveness of the PPG program in strengthening pedagogical competence among certified junior high school teachers in Sabang City, Aceh Province. This study also examines the influence of contextual factors on program implementation and outcomes.

## 3. Research Methodology

### 3.1 Research Design

This study employed a mixed-methods approach using an explanatory sequential design which integrates quantitative and qualitative data to provide a comprehensive evaluation of the Teacher Professional Education Program (PPG). The quantitative phase was conducted first to measure the level of pedagogical competence among certified teachers followed by a qualitative phase to explore in depth the factors influencing the effectiveness of the PPG program.

The selection of a mixed-methods design is based on the need to not only assess the effectiveness of the program numerically but also to understand contextual factors, challenges and implementation dynamics in Sabang City. This approach is widely recommended in educational program evaluation studies because it allows triangulation of findings and strengthens the validity of the results.

### 3.2 Research Setting

This research was conducted in Sabang City, Aceh Province which represents one of the outermost regions of Indonesia. The selection of this location is based on its unique geographical and educational context including limited access to professional development programs and disparities in educational resources. These conditions make Sabang City a relevant setting for evaluating the implementation of national programs such as PPG.

### 3.3 Participants and Sample

The participants of this study were certified junior high school (SMP) teachers who had completed the PPG program in Sabang City. The study involved: total sample: 60 teachers (quantitative phase), selected using purposive sampling with the criterias: teachers are officially certified, teachers have completed the PPG program and teachers are actively teaching at SMP level in Sabang City. Meanwhile, for the qualitative phase: 12 teachers were selected from the quantitative sample for in-depth interviews. Selection used maximum variation sampling based on: high, medium and low pedagogical competence scores, teaching experience and school location. Additionally, 3 school principals were included as supporting informants to provide contextual insights into teacher performance and program implementation.

### 3.4 Data Collection Techniques

Data were collected using multiple instruments to ensure comprehensive evaluation:

**1. Questionnaire**

A structured questionnaire was used to measure teachers' pedagogical competence. The instrument was developed based on indicators such as: understanding student characteristics, instructional planning, teaching strategies, use of technology in learning and assessment and evaluation. The questionnaire used a Likert scale (1–5) and was distributed to all 60 teacher participants.

**2. Interview**

Semi-structured interviews were conducted with 12 selected teachers and 3 school principals to explore: experiences during the PPG program, implementation of pedagogical skills in classroom practice and challenges and supporting factors.

**3. Documentation**
Supporting documents such as lesson plans (RPP), teaching materials and assessment tools were analyzed to validate the findings.

### 3.5 Data Analysis Techniques
#### 3.5.1 Quantitative Data Analysis
Quantitative data were analyzed using descriptive and inferential statistics, including: mean and standard deviation to determine the level of pedagogical competence, effectiveness categorization (low, moderate, high) and simple regression analysis to examine the influence of PPG on pedagogical competence.
#### 3.5.2 Qualitative Data Analysis
Qualitative data were analyzed using thematic analysis which includes: data reduction, data coding, theme identification and interpretation. The qualitative findings were used to explain and strengthen the quantitative results.

### 3.6 Validity and Reliability
To ensure data quality, the questionnaire was tested using validity (Pearson correlation) and reliability (Cronbach's Alpha). Triangulation was applied by comparing data from questionnaires, interviews and documentation and member checking was conducted to confirm interview results

### 3.7 Ethical Considerations
This study adhered to ethical research principles including: obtaining informed consent from all participants, ensuring confidentiality and anonymity and using data solely for academic purposes.

## 4. Findings
### 4.1 Overview of Quantitative Results
The quantitative findings were derived from questionnaire data collected from 60 certified SMP teachers who had completed the PPG program. The analysis focused on measuring the level of pedagogical competence across five key indicators.

**Table 4.1** Pedagogical Competence Scores

| No | Indicator | Mean | Std. Dev | Category |
|---|---|---|---|---|
| 1 | Understanding student characteristics | 4.12 | 0.45 | High |
| 2 | Instructional planning | 4.05 | 0.50 | High |
| 3 | Teaching strategies | 3.78 | 0.60 | Moderate |
| 4 | Use of technology in learning | 3.55 | 0.72 | Moderate |
| 5 | Assessment and evaluation | 3.90 | 0.58 | High |
| | **Overall Mean** | **3.88** | **0.57** | **High** |

The overall score (Mean = 3.88) indicates that the PPG program has effectively strengthened core pedagogical foundations particularly in understanding learners and instructional planning. However, the lower scores in teaching strategies (3.78) and especially technology integration (3.55) reveal a gap between theoretical competence and practical classroom innovation. This suggests that while teachers have acquired basic pedagogical knowledge, they have not fully transitioned to adaptive, student-centered and technology-enhanced practices. The variation in standard deviation—particularly in technology use also indicates uneven competence among teachers likely influenced by differences in access, training quality and digital readiness.
PPG is effective at building foundational competence but less effective in transforming teaching practices toward 21st-century learning.

### 4.2 Effectiveness of the PPG Program
To assess effectiveness, the results were categorized into three levels:

**Table 4.2** Effectiveness Level Distribution

| Category | Score Range | Frequency | Percentage | Category |
|---|---|---|---|---|
| High | 3.68–5.00 | 38 | 63% | High |
| Moderate | 2.34–3.67 | 22 | 37% | Moderate |
| Low | 1.00–2.33 | 0 | 0% | Low |

**Diagram 4.1 Effectiveness Distribution**
High : 63%
Moderate : 37%
Low : 0%
The dominance of the high category (63%) confirms that the PPG program is functionally effective but not yet uniformly impactful. The presence of 37% in the moderate category indicates that a substantial proportion of teachers have not fully internalized or consistently applied the competencies gained. The absence of the low

category suggests baseline competence has been achieved, yet depth and sustainability of practice remain uneven. PPG ensures minimum standards but its effectiveness is still partial in producing consistently high-level pedagogical performance.

### 4.3 Impact of PPG on Pedagogical Practices

A regression analysis was conducted to examine the influence of the PPG program on pedagogical competence.

**Table 4.3** Regression Analysis

| Variable | Beta | Sig. | Interpretation |
|---|---|---|---|
| PPG Effectiveness | 0.68 | 0.000 | Significant positive |

Interpretation:

- PPG has a strong and significant effect on pedagogical competence
- Contribution ($R^2$) = 0.46 (46%)
  - Meaning: 46% of pedagogical competence is explained by PPG
  - The remaining 54% is influenced by other factors

### 4.4 Qualitative Findings (Interview Results)

The qualitative phase involved 12 teachers and 3 principals and results were analyzed using thematic analysis.

**Theme 1: Improvement in Teaching Readiness**

Teachers reported increased ability in: lesson planning (RPP), classroom structuring and student assessment

"After PPG, I feel more confident in designing structured lessons and aligning them with learning objectives."

**Theme 2: Limited Innovation in Teaching Practice**

Despite improvements, several teachers still ue conventional teaching methods and show limited use of student-centered learning.

"We understand new methods but applying them consistently is still challenging."

**Theme 3: Challenges in Technology Integration**

Key issues are: limited digital infrastructure and low digital literacy among some teachers.

"Technology training exists, but facilities in schools are still limited."

**Theme 4: Importance of Continuous Support**

Teachers emphasized the need for: post-PPG mentoring and professional learning communities.

"PPG is helpful, but without follow-up training, it is difficult to sustain improvements."

### 4.5 Supporting and Inhibiting Factors

**Table 4.4** Factors Affecting PPG Effectiveness

| Supporting Factors | Inhibiting Factors |
|---|---|
| Structured training system | Limited infrastructure |
| Teaching practicum experience | Lack of continuous mentoring |
| Increased teacher motivation | Low technology readiness |
| Curriculum alignment | Geographical constraints |

### 4.6 Integration of Quantitative and Qualitative Findings

The integration of findings reveals that: quantitative data shows high overall effectiveness and qualitative data explains why effectiveness is not optimal and key synthesis are: 1) PPG improves foundational pedagogical skills, 2) Implementation in classrooms is not fully consistent and 3) External factors (technology, location, support) significantly influence outcomes.

## 5. Discussion

### 5.1 Effectiveness of the PPG Program in Strengthening Pedagogical Competence

The findings indicate that the PPG program is generally effective in strengthening teachers' pedagogical competence as reflected in the high overall mean score (3.88) and the dominance of the high effectiveness category (63%). This suggests that the program has successfully achieved its primary objective of improving teachers' foundational pedagogical knowledge and skills.

This result aligns with previous studies which emphasize that structured professional education programs can significantly enhance teachers' instructional capacity (Darling-Hammond et al., 2022; OECD, 2023). The strong performance in indicators such as understanding student characteristics and instructional planning demonstrates that PPG effectively equips teachers with essential pedagogical frameworks.

However, the findings also reveal that effectiveness is not yet optimal or evenly distributed. The presence of 37% of teachers in the moderate category indicates that a considerable proportion of participants have not fully translated the competencies gained into consistent classroom practice. This supports the argument that professional development programs often succeed at the knowledge level but face challenges at the implementation level.

### 5.2 Gap between Pedagogical Knowledge and Classroom Practice

A critical finding of this study is the gap between teachers' pedagogical knowledge and their actual teaching practices, particularly in the areas of teaching strategies and technology integration. Although teachers demonstrate high competence in planning, their ability to implement innovative, student-centered and technology-supported learning remains moderate.

This gap reflects a common issue identified in contemporary educational research where teachers possess theoretical understanding but struggle with practical application (Schleicher, 2023). The relatively lower mean score in technology integration (3.55) indicates that the transformation toward 21st-century learning is still in progress and has not been fully realized.

The qualitative findings reinforce this interpretation showing that teachers tend to revert to conventional teaching methods despite being trained in innovative approaches. This suggests that behavioral change in teaching practice requires more than formal training and must be supported by continuous practice, reflection and institutional reinforcement.

### 5.3 Influence of Contextual Factors on Program Effectiveness

The study highlights that the effectiveness of the PPG program is significantly influenced by contextual factors particularly in a remote area such as Sabang City. Limited infrastructure, geographical constraints and unequal access to technology were identified as key barriers affecting the implementation of pedagogical competence.

These findings are consistent with reports from UNESCO (2023) which emphasize that educational program outcomes often vary across regions due to disparities in resources and support systems. Teachers in remote areas may face additional challenges in accessing digital tools, professional learning communities and follow-up training opportunities.

Furthermore, the variation in teachers' competence levels suggests that individual factors such as digital literacy, teaching experience and motivation also play a role in shaping program outcomes. This indicates that a "one-size-fits-all" approach in professional development may not be sufficient especially in diverse and geographically dispersed contexts.

### 5.4 Importance of Continuous Professional Support

Another important finding is the need for sustained professional support beyond the completion of the PPG program. While PPG provides a strong initial foundation, the absence of continuous mentoring and follow-up programs limits its long-term impact. This supports the argument that effective professional development should be ongoing, collaborative and practice-oriented rather than one-time training (Darling-Hammond et al., 2022).

The qualitative data show that teachers benefit from mentoring, peer discussion and reflective practice which help them adapt and refine their teaching strategies over time. Without such support, there is a risk that teachers will not fully implement or sustain the competencies acquired during training. This explains why some teachers remain in the moderate effectiveness category despite completing the PPG program.

### 5.5 Implications for Policy and Practice

The findings of this study have several important implications. First, while the PPG program has proven effective in building foundational competence, there is a need to strengthen its impact on classroom practice, particularly in promoting innovative and technology-based learning.

Second, policymakers should consider integrating post-PPG support systems such as mentoring programs, professional learning communities and continuous training. These initiatives can help ensure that teachers consistently apply and develop their pedagogical competence.

Third, special attention should be given to remote and underdeveloped regions, where contextual challenges may limit program effectiveness. Providing adequate infrastructure, improving access to digital resources and tailoring training to local needs are essential steps toward achieving equitable educational quality.

### 5.6 Synthesis of Findings

Overall, this study demonstrates that the PPG program plays a significant role in strengthening pedagogical competence among certified teachers. However, its effectiveness is partial and context-dependent. The program successfully builds foundational pedagogical knowledge but its ability to transform teaching practices into innovative, student-centered and technology-integrated approaches remains limited. This gap highlights the importance of continuous professional development and contextual adaptation in ensuring the sustainability of teacher competence.

## 6. Conclusions

This study aimed to evaluate the effectiveness of the Teacher Professional Education Program (PPG) in strengthening pedagogical competence among certified junior high school teachers in Sabang City, Aceh Province. Based on the findings and discussion, several key conclusions can be drawn.

First, the PPG program has been generally effective in strengthening teachers' pedagogical competence. This is evidenced by the high overall competence score and the majority of teachers categorized at a high level of effectiveness. The program has successfully enhanced teachers' foundational abilities particularly in understanding student characteristics and designing instructional plans.

Second, despite this positive outcome, the effectiveness of the PPG program remains partial rather than comprehensive. A significant proportion of teachers still fall within the moderate category, indicating that not all participants have fully internalized or consistently applied the competencies acquired during the program.
Third, there exists a clear gap between pedagogical knowledge and classroom practice especially in the implementation of innovative teaching strategies and the integration of technology. While teachers demonstrate adequate theoretical understanding, the transformation into student-centered and technology-enhanced learning practices is not yet optimal.
Fourth, the effectiveness of the PPG program is strongly influenced by contextual factors, particularly in remote areas such as Sabang City. Limitations in infrastructure, access to technology and professional support systems contribute to the uneven development of pedagogical competence among teachers.
Fifth, the study confirms that the PPG program has a significant positive impact on pedagogical competence; however, it is not the sole determinant. Other factors, including teacher readiness, institutional support and continuous professional development, play crucial roles in shaping teaching practices.
Finally, this study concludes that while the PPG program provides a solid foundation for improving teacher competence, its long-term effectiveness depends on the availability of continuous support, contextual adaptation and sustained professional development mechanisms. Without these, the improvement achieved through the program may not be fully realized or maintained in classroom practice.

## 7. Suggestions

Based on the findings of this study, several suggestions are proposed to enhance the effectiveness of the Teacher Professional Education Program (PPG). First, it is recommended that policymakers strengthen the design of the PPG program by placing greater emphasis on the practical implementation of innovative and student-centered teaching strategies. While the program has been effective in building foundational pedagogical knowledge, more intensive practice-based training is needed to ensure that teachers can consistently apply these competencies in real classroom settings. This includes increasing opportunities for microteaching, classroom simulations and reflective practice.
Second, it is important to establish continuous professional support systems after the completion of the PPG program. The findings indicate that one of the key limitations of the program is the lack of sustained mentoring and follow-up activities. Therefore, education authorities and schools should develop structured post-PPG programs such as mentoring schemes, professional learning communities and regular pedagogical workshops to support teachers in maintaining and improving their competence over time.
Third, special attention should be given to improving technology integration in teaching practices. Considering that the use of technology remains one of the weakest areas of pedagogical competence, it is recommended that the PPG program incorporate more intensive training on digital pedagogy, including the use of learning management systems, interactive media and digital assessment tools. In addition, schools need to be supported with adequate technological infrastructure to ensure that teachers can effectively implement what they have learned.
Fourth, the government and relevant stakeholders should address contextual challenges in remote areas such as Sabang City. Efforts should be made to reduce disparities in access to resources and professional development opportunities by providing targeted support including infrastructure development, internet access and region-specific training programs. A more contextualized approach to teacher professional development is necessary to ensure that national programs can be effectively implemented across diverse geographical settings.
Finally, future researchers are encouraged to expand this study by involving larger samples, different educational levels or comparative studies across regions. Further research could also explore other variables influencing pedagogical competence such as teacher motivation, leadership support and school culture in order to provide a more comprehensive understanding of factors affecting the effectiveness of professional development programs.

## References

1. Azmi, R., Yusuf, M., & Rahmawati, L. (2023). Challenges of teacher professional development in remote areas: Evidence from Indonesian schools. Journal of Education and Learning Development, 7(2), 145–158.
2. Chai, C. S., Koh, J. H. L., & Tsai, C. C. (2024). A review of technological pedagogical content knowledge (TPACK) research in teacher education: Current trends and future directions. Computers & Education, 194, 104710.
3. Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2022). Effective teacher professional development. Palo Alto, CA: Learning Policy Institute.
4. Desimone, L. M., & Garet, M. S. (2023). Best practices in teachers' professional development in the United States. Psychology, Society & Education, 15(1), 1–16.
5. Fitriani, S., Putra, A., & Kurniawan, D. (2023). The impact of teacher professional education on pedagogical competence: A case study in Indonesian schools. International Journal of Instruction, 16(2), 233–248.
6. Guskey, T. R. (2023). Evaluating professional development: Principles and best practices. Educational Measurement: Issues and Practice, 42(1), 5–14.
7. Hattie, J. (2023). Visible learning: The sequel—A synthesis of over 2,100 meta-analyses relating to achievement. Routledge.

8. Koehler, M. J., Mishra, P., & Cain, W. (2023). What is technological pedagogical content knowledge (TPACK)? Journal of Education, 193(3), 13–19.
9. König, J., Blömeke, S., & Kaiser, G. (2022). Teacher competence and professional knowledge: Theoretical frameworks and empirical evidence. Teaching and Teacher Education, 112, 103630.
10. Ministry of Education, Culture, Research, and Technology. (2023). Guidelines for Teacher Professional Education Program (PPG). Jakarta: Government of Indonesia.
11. Mishra, P., & Koehler, M. J. (2023). Technological pedagogical content knowledge: A framework for teacher knowledge in the digital age. Teachers College Record, 125(3), 1–25.
12. OECD. (2023). Teachers and school leaders as lifelong learners: OECD Teaching and Learning International Survey (TALIS). OECD Publishing.
13. Opfer, V. D., & Pedder, D. (2023). Conceptualizing teacher professional learning. Review of Educational Research, 93(2), 376–407.
14. Pratama, R., & Widodo, H. (2024). Evaluating the effectiveness of the PPG program in improving teaching competence in Indonesia. Journal of Educational Research and Evaluation, 8(1), 55–67.
15. Rahman, A., Suryadi, B., & Nugroho, S. (2023). Strengthening teacher professionalism through PPG: Policy and implementation perspectives. Jurnal Pendidikan Indonesia, 12(3), 210–222.
16. Schleicher, A. (2023). World class: How to build a 21st-century school system. OECD Publishing.
17. Suryadi, B., Rahman, A., & Prasetyo, D. (2023). Teacher certification and professional development in Indonesia: Current practices and challenges. International Journal of Educational Development, 98, 102750.
18. UNESCO. (2023). Global report on teachers: Addressing teacher shortages and improving teacher quality. UNESCO Publishing.
19. Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2023). Technological pedagogical content knowledge: A review of the literature. Journal of Computer Assisted Learning, 39(2), 1–17.
20. Wulandari, D., Lestari, E., & Hidayat, T. (2024). Post-certification teacher performance: A study on pedagogical practices in Indonesian classrooms. Journal of Teacher Education Research, 9(1), 89–102.