

Analysis of PGSD Students' Pedagogical Competence in Developing Innovative Learning Designs

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Abstract

This study is motivated by the limited research examining PGSD students' pedagogical competence in relation to their ability to develop innovative learning designs, despite its importance in 21st-century learning. This study aims to analyze the pedagogical competence of PGSD students in developing innovative learning designs and to identify aspects that require improvement. A qualitative-dominant mixed-methods design with exploratory quantitative elements was employed. The study involved 30 PGSD students selected through purposive sampling. Data were collected through observation, semi-structured interviews, and documentation of lesson plans or teaching modules. The instrument used was a 1–4 scale assessment rubric, with quantitative data analyzed using descriptive statistics, including mean, standard deviation, and percentage, through SPSS and Excel, while qualitative data were analyzed thematically. The findings show that students' pedagogical competence was in the fairly good category, with the highest score in learning planning ($M = 3.25$). However, technology use ($M = 2.60$) and learning evaluation ($M = 2.50$) remained relatively low. Thematic analysis revealed three main themes: basic systematicity (83%), limited TPACK integration (73%), and the dominance of conventional evaluation (80%). These findings indicate a gap between students' theoretical understanding and practical implementation in designing innovative learning. The study concludes that PGSD students' pedagogical competence has developed in learning planning but remains suboptimal in technology integration and authentic assessment. This study contributes to teacher education literature by providing empirical insight into pedagogical competence development and

highlights the need to strengthen TPACK-based learning and authentic assessment in preparing prospective elementary school teachers.

Keywords: Pedagogical Competence; PGSD Students; Innovative Learning Design; TPACK; Authentic Assessment

INTRODUCTION

Pedagogical competence is a fundamental element of education that plays a vital role in shaping the quality of learning processes and outcomes, both nationally and internationally. As the primary actors in learning, teachers are required to possess adequate pedagogical skills to create effective, adaptive, and meaningful learning. In a global context, the demands of 21st-century education emphasize the importance of teachers' ability to design innovative, creative, and technology-based learning to develop critical thinking, collaboration, communication, and creativity skills in students (Jurina & Gorlova, 2018). This demonstrates that the role of teachers has shifted from merely conveying information to facilitating learning oriented toward the development of 21st-century competencies.

In a national context, strengthening pedagogical competence is also a priority in Indonesian education policy. Standards for teacher competencies highlight the significance of comprehending student traits, planning instruction, delivering lessons, and performing efficient learning assessments (Fatmawati, 2021). Studies indicate that pedagogical competence has a strong correlation with learning quality and student involvement in the classroom (Apriyantika & Dea Mustika, 2023). However, various studies reveal that the pedagogical abilities of prospective teacher students are still suboptimal, particularly in designing innovative learning that is appropriate to technological developments and student needs (Merdekawaty dkk., 2024 ;Purwanti & Suhargo, 2024).

In response to these challenges, strengthening pedagogical competencies is necessary from the beginning of higher education, particularly for students in the Elementary School Teacher Education (PGSD) Study Program. PGSD students, as prospective teachers, are required not only to understand learning theory but also to be able to implement innovative learning designs in practice. In this regard, the Technological Pedagogical Content Knowledge (TPACK) framework is highly relevant because it integrates aspects of technology, pedagogy, and content in learning (Koehler dkk., 2013 ; Mishra & Koehler, 2006). Research shows that mastery of TPACK significantly influences teachers' ability to

design technology-based learning (Howard dkk., 2021; Zulhazlinda dkk., 2023). Furthermore, the implementation of innovative learning models such as Problem-Based Learning (PBL), Project-Based Learning (PjBL), and Discovery Learning has been proven to improve student engagement and learning outcomes (Tafakur dkk., 2023 ; Bell, 2010). Innovative learning emphasizes a learner-centered approach, the use of technology, and the development of higher-order thinking skills. Therefore, PGSD students need to be equipped with the ability to design innovative and contextual learning.

Previous research has shown that PGSD students' abilities in designing learning vary. (Afian dkk., 2023a) found that some students were able to develop learning materials, but still tended to use conventional approaches. (Mulyaningsih, 2020) also revealed that students experienced difficulties in developing systematic and innovative Lesson Implementation Plans (RPP). Meanwhile, research by (Rahmah dkk., 2024) showed that microteaching activities can improve students' pedagogical competence, but do not fully develop aspects of learning innovation. Other studies also confirm that there is a gap between students' theoretical mastery and practical learning abilities. This is particularly evident in their ability to integrate technology into instructional design (Perdani & Andayani, 2022) . In fact, a study by (Tondeur dkk., 2016) showed that many prospective teachers struggle to effectively integrate technology due to a lack of practical experience during their education.

This gap indicates the need for a more in-depth study of the pedagogical competencies of primary school teacher education (PGSD) students, particularly in relation to their ability to design innovative learning designs. Pedagogical competencies encompass the ability to understand student characteristics, plan learning, implement learning, and evaluate learning outcomes (Saputra dkk., 2019). In recent developments, these competencies also encompass the ability to adapt to technology and learning innovations (Larassati & Alifah, 2025 ; Abdul Latip dkk., 2024 ; Scherer dkk., 2019). As prospective teachers, PGSD students play a strategic role in improving the quality of primary education. They are in the transition from learners to educational practitioners, requiring adequate professional preparedness. This preparedness encompasses pedagogical competence, technological mastery, and the ability to design innovative learning (Darling-Hammond dkk., 2017). Research shows that pedagogical competence and technological mastery significantly influence students' readiness to become teachers (König dkk., 2020).

In the context of modern learning, innovative learning design is a crucial indicator of pedagogical competence. Learning design is a systematic process for designing learning

activities, encompassing objectives, materials, methods, media, and evaluation (Silitonga dkk., 2022). Innovative learning is characterized by a student-centered approach, the use of technology, and the development of higher-order thinking skills (Ricaurte, 2016 ; Liu, 2025). A range of innovative learning models, including Problem-Based Learning (PBL), Project-Based Learning (PjBL), and Discovery Learning, have demonstrated effectiveness in enhancing learning quality (Lethulur dkk., 2025). Furthermore, the TPACK-based approach has also been shown to enhance student creativity in developing learning materials (Jannah & Rahman, 2021).

From the foregoing discussion, it can be concluded that pedagogical competence and the ability to design innovative learning represent two interconnected and essential aspects for PGSD students as future teachers. Nevertheless, a gap persists between theoretical mastery and practical application in the field. Accordingly, this study seeks to examine the pedagogical competence of PGSD students in developing innovative learning designs and to pinpoint areas requiring further enhancement. This research is anticipated to offer theoretical and practical contributions to teacher education in Indonesia, particularly in elevating the quality of elementary school learning.

METHODS

This study employed a mixed methods approach, predominantly qualitative with exploratory quantitative elements, to provide a comprehensive understanding of PGSD students' pedagogical competence in designing innovative learning. The qualitative approach was used to explore in depth students' abilities, experiences, and challenges, while the quantitative approach described the level of competence achievement through numerical data. This approach is supported by John W. Creswell (2014), who states that mixed methods integrate qualitative and quantitative data to obtain a more complete understanding of a phenomenon, and by (Johnson & Onwuegbuzie, 2004), who emphasize that combining methods enhances the depth and validity of findings. The research design used was descriptive with a convergent mixed methods model, in which qualitative and quantitative data were collected and analyzed simultaneously and then integrated during interpretation to provide a holistic picture of students' pedagogical competence. The population consisted of all students in the Elementary School Teacher Education (PGSD) program who had taken lesson planning or microteaching courses, while the sample was determined using purposive sampling based on specific criteria relevant to the research objectives (Campbell dkk., 2020).

namely students who had developed lesson plans (RPP) or teaching modules, with a total sample of 30 students. Data collection techniques included observation to assess students' teaching performance, semi-structured interviews to explore understanding and challenges, and documentation analysis of lesson plans or teaching modules.

The main instrument was a learning design assessment rubric using a 1–4 scale, covering indicators such as learning objectives, selection of models or methods, learning steps, use of media or technology, and evaluation. Instrument validity was established through expert judgment, while reliability was ensured through triangulation of observation, interview, and documentation data. Data analysis employed two methods: qualitative data was examined through thematic analysis using the interactive model proposed by (Hashimov, 2015), which includes data reduction, data presentation, and conclusion drawing in an ongoing and iterative process, along with theme identification as outlined by (Braun & Clarke, 2006). Meanwhile, quantitative data from the rubric were analyzed using descriptive statistics (mean, standard deviation, and percentage) with the help of SPSS or Microsoft Excel to provide a numerical representation of students' pedagogical competence, thereby strengthening and complementing the qualitative findings.

RESULTS

This section presents the research results clearly and in detail, based on field findings. The findings are presented to address the research problem regarding the pedagogical competence of primary school teacher education (PGSD) students in creating innovative learning designs. The data presented is supported by empirical evidence obtained through observation, interviews, and document analysis.

Quantitative Description of Pedagogical Competence

The quantitative analysis results were obtained from an assessment of 30 students ($n = 30$) using a 1–4 scale rubric for each pedagogical competency indicator. Data were analyzed using descriptive statistics in the form of average values (mean), standard deviations (SD), and category percentages..

Table 1. Descriptive Statistics of Students' Pedagogical Competence ($n=30$)

Competency Indicators	Mean	SD	Kategori
Objective Formulation	3.25	0.45	Good
Model Selection	3.10	0.50	Good
Learning Steps	2.95	0.55	Enough
Use of Technology	2.60	0.60	Enough

Competency Indicators	Mean	SD	Kategori
Learning Evaluation	2.50	0.65	Enough

Table 1 shows that students' pedagogical competence is relatively good in planning, particularly in formulating learning objectives. However, there was a decline in technology use and learning evaluation.

Table 2. Distribution of Innovative Learning Design Categories

Kategori	Jumlah	Persentase
Baik	8	27%
Cukup	17	57%
Kurang	5	16%

Table 2 shows that the majority of students are in the sufficient category (57%), which indicates that their ability to design innovative learning is not optimal.

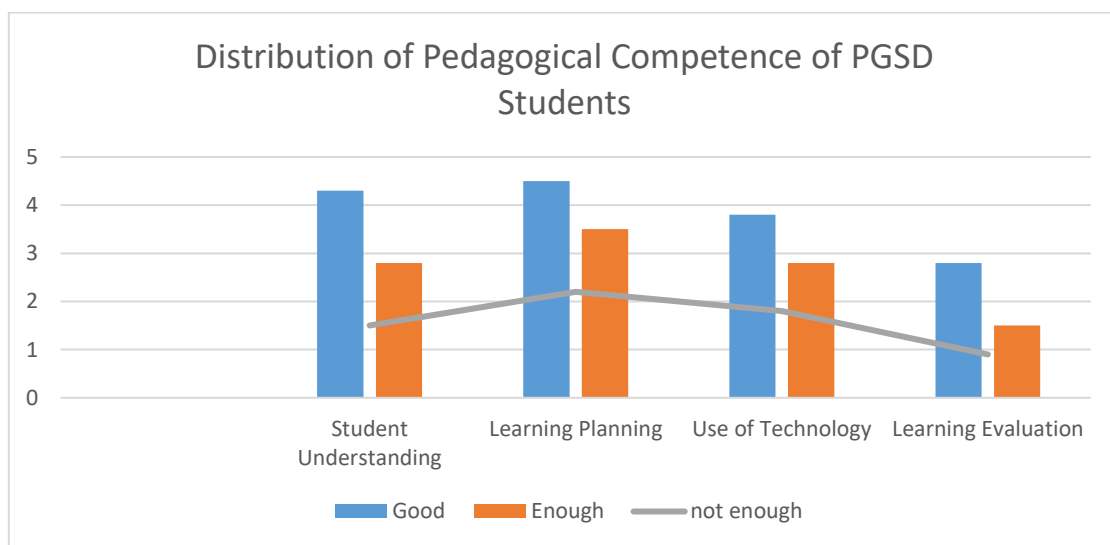


Figure 1. Distribution of Pedagogical Competence of PGSD Students

Figure 1 reinforces the finding that students' pedagogical competence is not evenly distributed across all indicators, particularly in technology integration and learning evaluation.

Qualitative Thematic Analysis (Dominant)

Based on a thematic analysis of 30 interviews and 90 lesson plans/teaching module documents, three main themes emerged that illustrate the pedagogical competencies of PGSD students.

Theme 1: "Basic Systematicity" (Frequency: 25/30; 83%)

Most students demonstrated the ability to systematically design learning, particularly in formulating learning objectives and developing learning activity steps.

"I always start with the core competency objectives and indicators, then choose the PBL method" (Student A-12, microteaching observation).

Observation findings indicate that approximately 80% of students are able to present learning in a structured manner, from introduction, main body, to conclusion. This demonstrates that students have a basic understanding of lesson planning.

However, this systematicity remains procedural in nature and does not fully reflect innovation in learning.

Theme 2: "Limited TPACK" (Frequency: 22/30; 73%)

Most students still experience difficulties in pedagogically integrating technology into their learning.

"Canva is interesting, but I'm confused about how to connect it to elementary school mathematics" (Student B-08).

Document analysis revealed that only 13 of 30 lesson plans (43%) integrated technology contextually with the learning material. Some students only used technology as a presentation tool, not as an integral part of their learning strategy. These findings indicate that students' understanding of the TPACK concept is still limited, especially in connecting technological aspects with content and pedagogy.

Theme 3: "Conventional Evaluation" (Frequency: 24/30; 80%)

Most students still use conventional evaluation methods, such as written tests, rather than authentic evaluation.

"Written tests are easier, but authentic assessments like portfolios are difficult to assess" (Student C-22).

Documentation results show that most lesson plans still use evaluation methods that are outcome-oriented, not process-oriented. The use of authentic assessments such as projects, portfolios, or performance assessments is still very limited. This indicates that students do not fully understand the concept of comprehensive learning evaluation that is oriented towards student competency development.

Mixed Methods Integration (Joint Display)

To strengthen the interpretation of the results, integration was carried out between quantitative and qualitative data in the form of the following joint display:

Table 3. Joint Display of Themes and Statistical Data

Qualitative Theme	Related Quantitative Data	Interpretation
Basic Systematicity	Mean goal = 3.25	Students are strong in basic planning
TPACK Limited	Mean technology = 2.60	Technology integration is still low
Conventional Evaluation	Mean evaluation = 2.50	Evaluation is not yet innovative

Table 3 shows that the quantitative results align with the qualitative findings. The aspect with the highest mean score (planning) is supported by the thematic finding of “basic systematicity,” while the aspect with the lowest mean score (technology and evaluation) aligns with the themes of “limited TPACK” and “conventional evaluation.”

Synthesis of Results

Overall, the research results indicate that the pedagogical competence of Elementary School Teacher Education (PGSD) students in developing innovative learning designs is considered quite good, with strengths in planning and weaknesses in technology integration and learning evaluation. The integration of quantitative and qualitative data provides a more comprehensive picture, indicating that students possess basic pedagogical competence, but are not yet optimal in developing innovative, technology-based learning.

The mean formula used is as follows:

$$\bar{X} = \frac{\sum X}{N}$$

Description:

\bar{X} = average value

$\sum X$ = total score

N = number of respondents

In addition, the standard deviation is used to see the distribution of data, with the formula:

$$SD = \sqrt{\frac{\sum (X - \bar{X})^2}{N}}$$

DISCUSSION

This section discusses the analysis, interpretation, and explanation of the research results regarding the pedagogical competence of PGSD students in creating innovative learning designs, by linking them to the research objectives, theories, and previous findings.

Analysis of Research Results

The results of the study indicate that the pedagogical competence of Elementary School Teacher Education (PGSD) students is in the fair category, with a primary strength in the aspect of lesson planning (Mean = 3.25). This indicates that students are able to formulate learning objectives, select models, and systematically design learning steps. This finding is supported by the results of the thematic analysis, which showed a dominant theme of "basic systematicity" (83%), indicating that the majority of students possess basic skills in lesson design.

However, the results of the study also showed weaknesses in the aspects of technology use (Mean = 2.60) and learning evaluation (Mean = 2.50). This is in line with the thematic findings of "limited TPACK" (73%) and "conventional evaluation" (80%), which indicate that students still have difficulty in integrating technology pedagogically and developing authentic evaluations. Thus, the results of this study indicate a gap between the mastery of pedagogical concepts and their implementation abilities in innovative learning designs, in accordance with the research objective of analyzing the level of students' pedagogical competence.

Comparison with Previous Research

The results of this study are consistent with various previous studies. (Afian dkk., 2023b) found that elementary school teacher education (PGSD) students were able to develop learning materials, but still tended to use conventional approaches. Similar findings were also expressed by (Mulyaningsih, 2020), who stated that students still experienced difficulties in developing innovative lesson plans. Furthermore, research by (Rahmah dkk., 2024) showed that microteaching activities can improve students' pedagogical competence, but do not fully develop innovation in learning.

From a theoretical perspective, these findings also align with the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasizes the importance of integrating technology, pedagogy, and content (Koehler et al., 2017). Students' low ability to integrate technology indicates that TPACK mastery is still suboptimal. This finding is also supported by research by Schmid et al. (2021), which states that prospective teachers still face challenges in implementing technology effectively in learning.

Therefore, this study not only confirms previous findings but also strengthens them through a mixed methods approach, providing a more comprehensive picture through the integration of quantitative and qualitative data.

Implications of Research Findings

The results of this study carry significant theoretical and practical implications. From a theoretical standpoint, this research bolsters the exploration of pedagogical competence within innovative learning contexts, especially emphasizing the integration of lesson planning, technology utilization, and authentic assessment. This research also broadens understanding of the role of TPACK as an important framework in teacher education.

Practically, the results of this study provide recommendations for the PGSD study program to improve the quality of learning through: (1) strengthening TPACK-based learning, (2) increasing innovation-oriented microteaching practices, (3) developing authentic evaluation skills, and (4) consistently applying innovative learning models. Thus, students not only have theoretical abilities, but are also able to implement innovative learning designs effectively.

Research Limitations

This study has several limitations that require consideration. First, the limited sample size ($n = 30$) and the fact that it was drawn from only one study program mean that the results cannot be broadly generalized. Second, despite using a mixed methods approach, the quantitative analysis is still descriptive in nature, thus not being able to examine the relationships between variables in depth. Third, there is potential for subjectivity in the assessment of student learning documents, despite data triangulation to increase validity.

Therefore, future research is recommended to involve a larger sample, use inferential quantitative analysis, and deepen the integration of data within a mixed methods approach to produce more robust and generalizable findings.

CONCLUSION

This study shows that the pedagogical competence of PGSD students in creating innovative learning designs is in the fairly good category, in accordance with the research objective to analyze the level of competence. Students have demonstrated strength in the aspect of learning planning, particularly in formulating objectives, selecting models, and systematically arranging learning steps (Mean = 3.25). However, the ability to integrate technology (Mean = 2.60) and develop learning evaluations (Mean = 2.50) is still relatively low. Thematic findings strengthen these results through three main patterns, namely basic systematicity, limited TPACK integration, and the dominance of conventional evaluation. Overall, the results of the study reveal a gap between mastery of pedagogical theory and the

implementation of innovative learning designs. However, this study has limitations, including a limited sample size ($n = 30$) and only one study program, which limits the generalizability of the results. Furthermore, the quantitative analysis used was still descriptive in nature, and there is potential subjectivity in document assessment despite data triangulation. Therefore, the results of this study need to be understood within the context of the research conducted.

Based on these limitations, future research is recommended to involve a broader sample, use inferential quantitative analysis, and strengthen the integration of a mixed methods approach. Furthermore, further studies could explore other variables such as digital literacy, teaching practice experience, and student professional readiness. Practically, the results of this study recommend strengthening TPACK-based learning, developing authentic evaluations, and enhancing innovative learning practices in teacher education to optimally enhance the pedagogical competence of PGSD students.

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