

RESEARCH

Received: August 28, 2025

Revised: September 29, 2025

Accepted: September 30, 2025

Evaluating the Effectiveness of a Blended Learning-Based Teacher Training Model in Improving the Pedagogical Competence of Senior High School Teachers

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Abstract

This study aims to evaluate the effectiveness of a blended learning-based teacher training model in improving the pedagogical competence of senior high school teachers. The study was motivated by the limited availability of sustainable professional development programs that effectively integrate technology into teaching practices. This research employed a quantitative approach using a pre-experimental design with a one-group pretest-posttest model. The participants consisted of 36 senior high school teachers from four schools in Ogan Komering Ilir Regency, South Sumatra. Data were collected using a pedagogical competence questionnaire administered before and after the training program. Instrument validity was examined through expert judgment, and reliability testing was conducted using Cronbach's Alpha. Data were analyzed using descriptive statistics and a paired sample t-test. The results indicate that the blended learning-based training model significantly improves teachers' pedagogical competence, particularly in lesson planning, technology integration, and the development of interactive learning media. The findings suggest that blended learning-based training can serve as an effective strategy for sustainable teacher professional development in the digital era. This study contributes to the development of technology-based teacher training models that support the improvement of pedagogical competence in secondary education. Keywords: teacher training, blended learning, pedagogical competence, professional development.

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Introduction

The development of information and communication technology has brought significant changes to various aspects of life, including education. Digital transformation in education has encouraged changes in the learning process, teaching methods, and the role of teachers in managing classroom learning. Teachers no longer serve only as transmitters of information, but

also as learning facilitators who are able to use technology to create more effective and interactive learning experiences (Bates, 2015).

In the context of 21st-century education, teachers are required to possess various competencies that support innovative learning and adaptability to technological development. One important competency is pedagogical competence, which includes the ability to design, implement, and evaluate the learning process effectively (Hattie, 2009). Teachers with strong pedagogical competence are able to create a conducive learning environment and support the optimal achievement of student learning outcomes.

Nevertheless, various studies show that many teachers still experience difficulties in integrating technology into teaching practice. This condition is caused by limited training, limited experience in using educational technology, and unequal access to digital learning resources (Darling-Hammond et al., 2017; Avalos, 2011).

Teacher professional development is an important strategy for improving the quality of education. Training programs that are systematically designed can improve teachers' knowledge, skills, and professional attitudes in implementing learning (Desimone, 2009). One approach that is widely used in teacher training is blended learning, which combines face-to-face learning with online learning (Garrison & Kanuka, 2004; Graham, 2013).

The blended learning approach enables training participants to learn flexibly through the integration of online and face-to-face learning activities. Through this approach, teachers can access various digital learning resources, participate in online discussions, and reflect on the learning practices they implement (Means et al., 2013).

A theoretical framework commonly used to explain technology integration in learning is Technological Pedagogical Content Knowledge (TPACK), which emphasizes the importance of integrating technological, pedagogical, and content knowledge in instruction (Mishra & Koehler, 2006). Teachers with strong TPACK competence are better able to design innovative learning that is relevant to technological developments.

Although many studies have examined the application of blended learning in student learning, research that specifically evaluates the effectiveness of blended learning-based teacher training models in improving teachers' pedagogical competence remains relatively limited, particularly in the context of senior high schools in regional areas. Therefore, this study aims to evaluate the effectiveness of a blended learning-based teacher training model in improving the pedagogical competence of senior high school teachers.

Method

This study used a quantitative approach with a pre-experimental design employing a one-group pretest-posttest design. This design was used to determine the effectiveness of blended learning-based training in improving teachers' pedagogical competence by comparing competence scores before and after the training.

The study was conducted in several senior high schools in Ogan Komering Ilir Regency, South Sumatra. The research population consisted of all senior high school teachers who participated in the district-level blended learning training program. The sampling technique used was purposive sampling, with the criteria that teachers had participated in the training and were actively teaching. Based on these criteria, 36 respondents from four schools were obtained.

Data were collected using a pedagogical competence questionnaire with a five-point Likert scale. The indicators of pedagogical competence included understanding students' characteristics, lesson planning, learning implementation, the use of learning technology, and

learning evaluation.

Instrument validity was examined through expert judgment by two education experts. Instrument reliability was tested using Cronbach's Alpha to ensure internal consistency. Data analysis was conducted using descriptive statistics and a paired sample t-test with the assistance of statistical software.

Results and Discussion

Description of Teachers' Pedagogical Competence Before and After Training

This study aimed to evaluate the effectiveness of a blended learning-based teacher training model in improving the pedagogical competence of senior high school teachers. To determine changes in teachers' pedagogical competence, measurements were conducted before the training (pretest) and after the training (posttest). The data obtained were then analyzed using descriptive statistics to describe the overall changes in teachers' pedagogical competence.

Table 1 Descriptive Statistics of Teachers' Pedagogical Competence

Variable	N	Mean	Minimum	Maximum	Std. Deviation
Pretest	36	72.45	65	80	4.82
Posttest	36	84.67	76	92	4.15

Based on Table 1, the mean score of teachers' pedagogical competence before participating in the training was 72.45. After participating in the blended learning-based training, the mean score of teachers' pedagogical competence increased to 84.67. This indicates an increase of 12.22 points after teachers participated in the training program.

In addition, the minimum and maximum scores in the posttest also showed an increase compared with the pretest scores. This indicates that most teachers experienced an improvement in pedagogical competence after participating in the training. This finding shows that training programs integrating online and face-to-face learning can provide a more flexible learning experience and support the improvement of teachers' professional competence.

2. Results of the Paired Sample T-Test

To determine whether the increase in teachers' pedagogical competence was statistically significant, an analysis was conducted using a paired sample t-test. This test was used to compare teachers' pedagogical competence scores before and after participating in the training.

Table 2 Results of the Paired Sample T-Test

Variable	Mean Difference	t-value	Sig. (p)
Pretest – Posttest	-12.22	-8.54	0.000

The analysis results in Table 2 show that the t-value was -8.54 with a significance level of $p = 0.000$ ($p < 0.05$). This indicates that there was a significant difference between teachers' pedagogical competence scores before and after participating in blended learning-based training. Therefore, it can be concluded that the blended learning-based training model had a significant effect on improving the pedagogical competence of senior high school teachers.

Discussion

The results of the study show that the mean score of teachers' pedagogical competence before the training was 72.45 and increased to 84.67 after the training. This increase indicates a positive change in teachers' pedagogical competence after participating in blended learning-

based training.

The paired sample t-test results showed a significance value of $p < 0.05$, meaning that there was a significant difference between the pretest and posttest scores. This demonstrates that blended learning-based training is effective in improving teachers' pedagogical competence.

This finding shows that the blended learning approach provides a more flexible and interactive learning experience for teachers. From the perspective of educational management, this training model enables educational institutions to organize teacher professional development programs more efficiently and sustainably.

In addition, blended learning-based training also encourages teachers to become more active in using learning technology. This is important because teachers involved in technology-based training tend to be more prepared to integrate technology into classroom learning.

The findings of this study are consistent with TPACK theory, which emphasizes the importance of integrating technological, pedagogical, and content knowledge in learning (Mishra & Koehler, 2006). In addition, the results of this study are supported by previous research showing that technology-based training programs can improve teachers' professional competence (Philipsen et al., 2019).

Conclusion

This study aimed to evaluate the effectiveness of a blended learning-based teacher training model in improving the pedagogical competence of senior high school teachers. The results show that blended learning-based training had a significant effect on improving teachers' pedagogical competence. This was indicated by a significant difference between teachers' pedagogical competence scores before and after participating in the training. The improvement shows that the integration of online and face-to-face learning in the training program can provide a more flexible, interactive, and effective learning experience for teachers.

Blended learning-based training not only provides teachers with opportunities to acquire new knowledge, but also enables them to develop skills in using learning technology and designing more innovative and learner-centered instruction. Therefore, this training model can become an effective alternative strategy to support teacher professional development in the digital era.

The results of this study also show that teacher professional development that utilizes learning technology can improve teachers' readiness to face changes in teaching practices in the era of digital transformation. Therefore, the implementation of blended learning-based training models needs to be continuously developed and integrated into various teacher competency development programs at both the school and local government levels.

Nevertheless, this study still has several limitations, particularly in relation to the number of respondents and the research area, which was limited to senior high schools in Ogan Komering Ilir Regency. Therefore, future research is expected to involve a larger number of respondents and cover a broader research area in order to obtain a more comprehensive picture of the effectiveness of blended learning-based teacher training in improving teachers' pedagogical competence.

References

- Anderson, T. (2011). *The theory and practice of online learning* (2nd ed.). Edmonton: Athabasca University Press.
- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education*, 27(1), 10–20.
- Bates, A. W. (2015). *Teaching in a digital age: Guidelines for designing teaching and learning*. Vancouver: BCcampus.

- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Palo Alto, CA: Learning Policy Institute.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199.
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7(2), 95–105.
- Graham, C. R. (2013). Emerging practice and research in blended learning. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 333–350). New York: Routledge.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.
- Howard, S. K., Tondeur, J., Siddiq, F., & Scherer, R. (2021). Ready, set, go! Profiling teachers' readiness for online teaching in secondary education. *Technology, Pedagogy and Education*, 30(1), 141–158.
- Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.
- König, J., Jäger-Biela, D., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects. *European Journal of Teacher Education*, 43(4), 608–622.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2013). *The effectiveness of online and blended learning*. New York: Teachers College Press.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Philipsen, B., Tondeur, J., Pareja Roblin, N., Vanslambrouck, S., & Zhu, C. (2019). Improving teacher professional development for online and blended learning: A systematic meta-aggregative review. *Educational Technology Research and Development*, 67(5), 1145–1174.
- Rasmitadila, R., Aliyyah, R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. (2020). The perceptions of primary school teachers toward online learning during the COVID-19 pandemic period. *Journal of Ethnic and Cultural Studies*, 7(2), 90–109.
- Trust, T. (2017). Motivation, empowerment, and innovation: Teachers' beliefs about how participating in the Edmodo Math Subject Community shapes teaching and learning. *Journal of Research on Technology in Education*, 49(1–2), 16–30.
- Tondeur, J., Aesaert, K., Pynoo, B., Van Braak, J., Fraeyman, N., & Erstad, O. (2017). Developing a validated instrument to measure preservice teachers' ICT competencies. *Computers & Education*, 62, 225–233.
- Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & Van Braak, J. (2013). Technological pedagogical content knowledge: A review of the literature. *Journal of Computer Assisted Learning*, 29(2), 109–121.
- Zhao, Y. (2012). *World class learners: Educating creative and entrepreneurial students*. Thousand Oaks, CA: Corwin.