



High School Teachers' Perceptions of Learning Innovation in the Indonesia-Timor-Leste Border Region

Yunawati Sele^{1a*}, Vinsensia Ulia Rita Sila^{2b}, Antonius Tuan Tana Ruron^{3c}

^{1,2,3} Biology Education Study Program, University of Timor, Indonesia

^ayunawatisele@gmail.com, ^brincesila@gmail.com, ^cantoniusruron@unimor.ac.id

Article History:

Received:

15-07-2026

Revised:

12-08-2026

Accepted:

08-09-2026

Keywords:

*Border region; High school;
Learning innovation, Teacher
perceptions*

*Correspondence Address:

yunawatisele@gmail.com

Abstract:

Learning innovation is an effort that needs to be undertaken by teachers. This study was conducted to describe high school teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region. This study employed a quantitative descriptive approach involving 90 high school teachers in Timor Tengah Utara Regency. Data were collected using a questionnaire on teachers' perceptions of learning innovation consisting of 10 statements using a five-point Likert scale. The collected data were analyzed using descriptive statistics. The results showed that high school teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region were in the Fair category, with a mean score of 70.73. Most teachers, namely 83.33%, had perceptions in the Poor and Fair categories, while only 14.44% of teachers had perceptions in the Good and Excellent categories. These findings indicate the need to strengthen teachers' perceptions of learning innovation and provide an empirical basis for developing contextual learning innovation guidelines to help teachers create learning that is creative, adaptive, and appropriate to local conditions.

This is an open-access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



Introduction (مقدمة)

The implementation of learning innovation is an urgent need amid the rapid development of technology and changing learning demands. The implementation of innovation is not only related to the use of complex technology but also to the application of various approaches, strategies, and learning resources that are appropriate to students' needs and learning characteristics. Liu et al. (2024) reported that research on *teacher innovation* has developed using various theoretical foundations and methodological approaches. Learning innovation has become part of educational practice that develops in line with learning needs. The appropriate

implementation of innovation can support the improvement of learning practices. In this process, teachers play an important role in implementing learning innovation to improve the quality of educational practices (Karolčík & Marková, 2025).

With their important position in supporting the success of learning innovation, teachers need to have an appropriate perspective. Könings et al. (2007) explained that teachers' perceptions of learning innovation refer to teachers' attitudes, beliefs, and perspectives in understanding a learning innovation. When facing learning challenges, such as variations in students' characteristics, learning demands, and school resources, teachers' perceptions will influence how they make decisions regarding learning practices. Ehlert et al. (2022) reported that teachers' perceptions are related to their attitudes toward educational practices, and perceptions of a particular learning innovation may differ from one teacher to another. In the context of educational research, examining teachers' perceptions is an important topic because it greatly determines how innovation is viewed by teachers as the implementers of learning.

Amid the rapid development of digital technology, teachers have many opportunities to develop and implement various learning innovations. However, it is important to understand that the presence of complex technology will not automatically result in changes in learning practices. Teaching skills and teachers' digital skills need to become important foundations in the process of integrating technology and learning. The presence of technology needs to be supported by teacher competence, including pedagogical competence, so that technology is not only viewed as a technical tool but also as a pedagogical tool in designing and implementing learning. Therefore, the level of teachers' perceptions is important as it becomes a foundation for teachers to ensure the development of learning innovation based on the use of available resources (Kim et al., 2013; Lai et al., 2022; Marwan & Sweeney, 2010; Sailer et al., 2021).

In carrying out their role, the characteristics and conditions of the environment surrounding schools are another aspect that needs to be considered. Particularly in border regions, geographical characteristics and the conditions of available resources have the potential to influence the learning innovations implemented by teachers. Kennedy et al. (2019), through their study of educational conditions in border regions of East Nusa Tenggara Province, reported that the availability of infrastructure is one of the challenges faced by teachers. This fact indicates that teachers in border regions need to view and interpret learning innovation contextually according to the various resources available at their schools.

Nenotek et al. (2023), through their study of learning in border regions, reported that teachers face unique challenges. These challenges include limited infrastructure supporting the digitalization of learning and teachers' capacity to utilize available resources. Teachers are not only required to operate technological devices but also to utilize digital learning platforms and media pedagogically. Teachers' abilities are important in translating digital resources into learning practices (Nenotek et al., 2023; Sailer et al., 2021).

Reports from several studies show that the availability of technology is not the only aspect that influences the implementation of learning innovation. Such efforts are also influenced by teachers' perceptions and abilities, as well as the conditions of the school environment. The resources available at school and in the surrounding environment need to be utilized optimally by teachers according to learning needs. Particularly in border regions where infrastructure and technological devices are limited, teachers' ability to implement learning innovation effectively and efficiently is important to examine. A study of teachers' perceptions is needed to understand how teachers perceive and adapt learning innovation according to the conditions they face.

Basically, research on *teacher innovation* and teachers' perceptions of learning innovation is important. However, previous studies have mainly discussed teachers' perceptions of innovation, including factors influencing teachers' perceptions in broader learning contexts

(Karolčík & Marková, 2025; Könings et al., 2007). The study shows that teachers' perceptions of learning innovation need to be understood by considering teachers' characteristics and school conditions. However, to date, there is still limited research specifically describing high school teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region. Therefore, this study can provide further information by presenting empirical evidence regarding teachers' perceptions of learning innovation in a region with resource characteristics and learning characteristics that differ from those of other regions.

Based on this background, this study was conducted to describe high school teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region. The results of this study can provide empirical evidence regarding how high school teachers in the border region perceive learning innovation. This evidence can subsequently serve as a basis for planning teacher competency development and providing learning support according to the needs of students and teachers in the border region.



Method (منهج)

This study employed a quantitative descriptive approach aimed at describing high school teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region. In quantitative descriptive research, data from respondents are used to describe phenomena related to the variables under study (Creswell & Creswell, 2018; Sugiyono, 2021). The study involved 90 high school teachers in Timor Tengah Utara Regency, located in the Indonesia-Timor-Leste border region. Respondents were selected using a simple random sampling technique. The reason for using this technique was to provide an equal opportunity for each member of the population to become a research respondent.

Data were collected using a questionnaire on teachers' perceptions of learning innovation. The questionnaire consisted of 10 statements covering the benefits of digital learning innovation, teachers' interest in using digital applications, teachers' confidence in implementing innovation, and the challenges of its implementation according to the conditions of schools in the border region. The questionnaire used a five-point Likert scale, namely strongly agree, agree, uncertain, disagree, and strongly disagree. The use of the questionnaire in this study was adjusted to the principle of using a research instrument that is appropriate to the variables being studied (Fraenkel et al., 2019). Before being used, the instrument underwent limited content validation to assess the alignment of the indicators with the measurement objectives and the clarity of each statement. The content validation process was conducted to ensure that each statement developed was appropriate to the aspect of teachers' perceptions of learning innovation that was the focus of this study.

Data collection was conducted online and offline by adjusting to the conditions and access available at the schools. The collected data were then analyzed using descriptive statistics to describe the level of teachers' perceptions. The analysis included the calculation of scores, mean scores, and the percentage of teachers' responses. The perception scores were used to determine the perception categories according to the categories presented in Table 1.

Table 1. Categories of Teachers' Perceptions

No.	Category	Mean Score Range
1.	Excellent	90–100
2.	Good	80–89
3.	Fair	70–79
4.	Poor	60–69
5.	Very Low	< 60



Discussion (مناقشة)

The results of the data analysis showed that the mean score of teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region was 70.73. Based on the categories presented in Table 1, this score was included in the Fair category. This fact indicates that teachers' perceptions of learning innovation have not yet reached an optimal level. Teachers need to be given space and opportunities to strengthen their perspectives on learning innovation as part of learning development.

More specifically, 2.22% or 2 respondents had perceptions in the Very Low category, 44.44% or 40 respondents had perceptions in the Poor category, 38.89% or 35 respondents had perceptions in the Fair category, 11.11% or 10 respondents had perceptions in the Good category, and 3.33% or 3 respondents had perceptions in the Excellent category. When combined, 83.33% of respondents had perceptions in the Poor and Fair categories. Only 14.44% of respondents had perceptions in the Good and Excellent categories. This distribution indicates that the responses were not evenly distributed toward the Good and Excellent categories. The complete distribution of teachers' perception categories is presented in Figure 1.

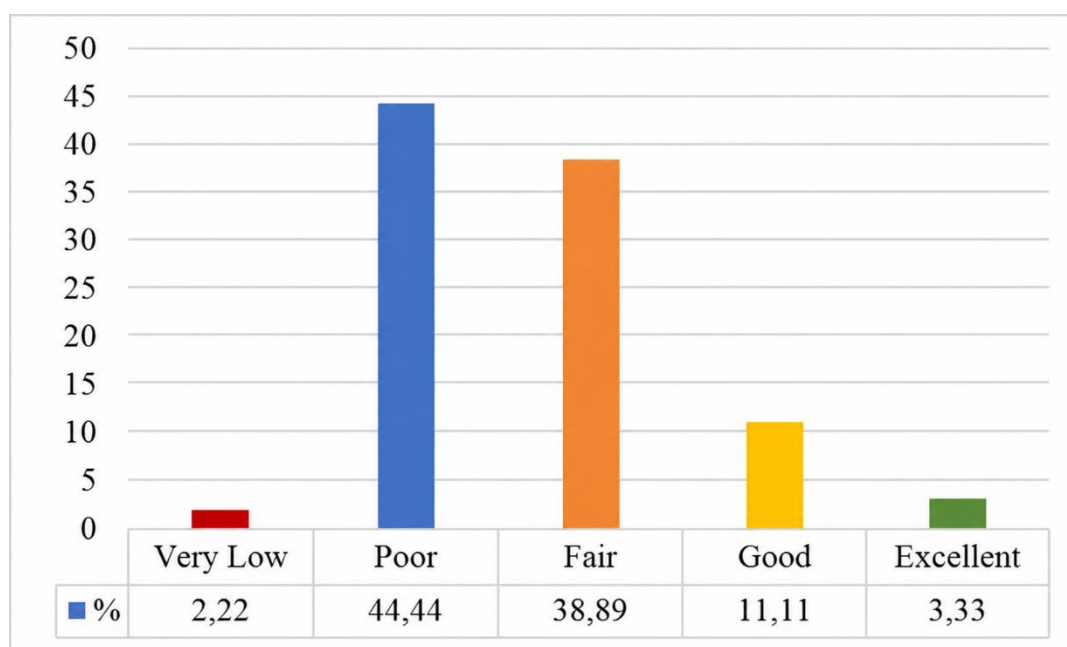


Figure 1. Categories of High School Teachers' Perceptions of Learning Innovation in the Indonesia-Timor-Leste Border Region

The findings showing that most respondents had perceptions in categories that were not yet optimal indicate the need to strengthen teachers' perceptions of learning innovation. However, it is important to note that this study focuses on teachers' perspectives and does not yet explain teachers' actual innovative behavior in learning. Basically, perceptions and innovative behavior are two different constructs. Innovative behavior covers broader aspects because it is related to innovative practices and teachers' ability to develop and realize new ideas in actual practice. Personal and environmental factors, including ability, motivation, and opportunities to innovate, can determine a person's innovative behavior (Thurlings et al., 2015). Therefore, this study is still limited to describing teachers' perceptions, and further studies specifically examining the actualization of these perceptions in the direct implementation of learning innovation are needed.

It is important to understand that although teachers' perceptions cannot directly explain the implementation of innovation, they are one aspect that can support teachers in understanding

and using technology in learning. Kim et al. (2013), in their report, explained that technology integration practices are related to teachers' beliefs and perspectives. How teachers view learning and technology is an aspect that has the potential to support technology-based learning. This is supported by Prestridge (2012), who stated that the integration of information and communication technology in learning can be related to teachers' beliefs. Although this study did not examine the relationship between perceptions and actual technology use practices, the fact that many teachers still have perceptions that are not yet optimal needs to receive attention in efforts to develop teacher competence.

Ertmer et al. (2012) explained that teachers' beliefs and technology-based learning practices can be influenced by environmental factors. Environmental conditions need to receive attention so that they can support teachers in developing and implementing new ideas in learning. Regarding environmental factors, the characteristics of border regions are an important aspect to consider in understanding the findings of this study. Kennedy et al. (2019) explained that educational issues, such as the availability of teachers and school infrastructure, exist in border regions of East Nusa Tenggara Province. This fact indicates that the development of learning innovation needs to consider the characteristics of schools and their surrounding environment. In line with this, Nenotek et al. (2023) reported that digitalization and the use of various technology-based learning platforms and media are among the issues faced by teachers and schools in border regions.

Although infrastructure issues can be one of the factors related to teachers' perceptions that are not yet optimal, the findings of this study also indicate the importance of viewing learning innovation more broadly and not only from the availability of technology. Sailer et al. (2021) explained that digital skills and teacher competence can serve as foundations for teachers to develop learning innovation. The availability of technology does not automatically determine the quality of digital-based learning. Pedagogical abilities are needed to support the use of technology in learning.

Learning innovation is not only related to the use of complex digital devices and platforms. Innovation can be developed by using available resources. Through the selection of learning strategies, the use of simple media, and the utilization of the environment as a learning resource, teachers still have opportunities to innovate. Limited infrastructure does not have to be the only basis for determining the form of learning innovation. Border regions have various resources that can still be used to develop learning innovation according to students' needs and school characteristics. This is in line with the reports of Ertmer et al. (2012) and Sailer et al. (2021), which explain that the use of educational technology is not only related to the availability of technology but also to teachers' abilities and learning objectives.

Furthermore, the findings also indicate the need to strengthen teacher competence in developing learning innovation. The data showing that most teachers' perceptions were in the Poor and Fair categories indicate that continuous guidance is needed to support teachers in selecting and integrating various resources into learning. Thurlings et al. (2015) showed that ability, motivation, and opportunity are aspects related to teachers' innovative behavior, while Sailer et al. (2021) emphasized the importance of digital and pedagogical skills in the use of technology for learning.

The findings of this study also provide an empirical basis for developing learning innovation guidelines based on digital resources. These guidelines should not only contain the use of digital platforms and devices but also examples of learning strategies appropriate to the resources and conditions of schools. Thus, learning innovation can be understood more broadly and not be limited to the use of complex technology. Learning innovation needs to be understood as the development of learning that is creative, adaptive, and appropriate to local conditions.



Conclusion (خاتمة)

Based on the results of the study, it can be concluded that high school teachers' perceptions of learning innovation in the Indonesia-Timor-Leste border region were in the Fair category, with a mean score of 70.73. Most teachers, namely 83.33%, had perceptions in the Poor and Fair categories, while only 14.44% of teachers had perceptions in the Good and Excellent categories. This fact indicates the need to strengthen teachers' perceptions of learning innovation and provides an empirical basis for developing contextual learning innovation guidelines. The development of teachers' abilities in the border region needs to be directed toward strengthening their understanding of learning innovation, improving digital pedagogical skills, as well as providing continuous training and support for teachers in selecting and utilizing available resources effectively and efficiently. Therefore, the development of teachers' abilities is not limited to the use of complex technology but also includes the ability to create learning that is creative, adaptive, and appropriate to local conditions.

Acknowledgment (شكر وتقدير)

The authors would like to express their gratitude to the Institute for Research and Community Service (LPPM), Universitas Timor, for providing funding and support throughout the implementation of this research.



Bibliography (مراجع)

- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Ehlert, M., Hebbeker, K., & Souvignier, E. (2022). Implementing evidence-based practices in reading classrooms: Longitudinal interrelations between teaching-related attitudes, innovation-specific perceptions, and perceived implementation success. *Studies in Educational Evaluation*, 75, 101203. <https://doi.org/10.1016/j.stueduc.2022.101203>
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, 59(2), 423-435. <https://doi.org/10.1016/j.compedu.2012.02.001>
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.
- Karolčík, Š., & Marková, M. (2025). How teachers perceive innovations in education. *Journal of Research in Innovative Teaching & Learning*, 18(1), 39-55. <https://doi.org/10.1108/JRIT-04-2023-0039>
- Kennedy, P. S. J., Tobing, S. J. L., & Toruan, R. L. (2019). Study of educational thematic data in the Indonesian border region in Nusa Tenggara Timur Province. *American Journal of Social Sciences and Humanities*, 4(1), 98-110. <https://doi.org/10.20448/801.41.98.110>
- Kim, C. M., Kim, M. K., Lee, C. J., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, 29(1), 76-85. <https://doi.org/10.1016/j.tate.2012.08.005>
- Könings, K. D., Brand-Gruwel, S., & Van Merriënboer, J. J. G. (2007). Teachers' perspectives on innovations: Implications for educational design. *Teaching and Teacher Education*, 23(6), 985-997. <https://doi.org/10.1016/j.tate.2006.06.004>
- Lai, C., Wang, Q., & Huang, X. (2022). The differential interplay of TPACK, teacher beliefs, school culture and professional development with the nature of in-service EFL teachers' technology adoption. *British Journal of Educational Technology*, 53(5), 1389-1411. <https://doi.org/10.1111/bjet.13200>
- Liu, S., Yin, H., Wang, Y., & Lu, J. (2024). Teacher innovation: Conceptualizations, methodologies, and theoretical framework. *Teaching and Teacher Education*, 145, 104611.
- Marwan, A., & Sweeney, T. (2010). Teachers' perceptions of educational technology integration in an Indonesian polytechnic. *Asia Pacific Journal of Education*, 30(4), 463-476.

- Nenotek, S. A., de Haan, A. E. M., Nifu, L. L., & Lindimara, E. (2023). Kesiapan guru dalam pembelajaran berbasis teknologi di perbatasan Indonesia-Timor Leste. *EDUKATIF: Jurnal Ilmu Pendidikan*, 5(5), 1975–1984. <https://doi.org/10.31004/edukatif.v5i5.5462>
- Prestridge, S. (2012). The beliefs behind the teacher that influences their ICT practices. *Computers & education*, 58(1), 449-458.
- Sailer, M., Murböck, J., & Fischer, F. (2021). Digital learning in schools: What does it take beyond digital technology? *Teaching and Teacher Education*, 103, 103346. <https://doi.org/10.1016/j.tate.2021.103346>
- Sugiyono. (2021). *Metode penelitian kuantitatif, kualitatif, dan R&D* (Cet. ke-3). Alfabeta.
- Thurlings, M., Evers, A., & Vermeulen, M. (2015). Toward a model of explaining teachers' innovative behavior: A literature review. *Review of Educational Research*, 85(3), 430–471. <https://doi.org/10.3102/0034654314557949>