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Digital Literacy of Economics Teachers in Senior High Schools in Minahasa Regency (A Qualitative Case Study)

Author:
Helmi Rorimpandey[1]
Allen Manongko[2]
Rahel Kimbal[3]

Afiliation:
Manado State University[1,2,3]

Corresponding email
allenmanongko@unima.ac.id

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Abstract
This study aims to analyze the digital literacy of economics teachers in several public high schools in Minahasa Regency. The main informants in this study were 11 economics teachers, plus supporting informants consisting of 3 students and 3 school principals. The data analysis technique used was the interactive analysis model by Miles and Huberman, which includes data reduction, data presentation, and conclusion drawing. This study used a qualitative approach with data collection through interviews. First, most economics teachers have a positive perception of digital technology, seeing it as an effective tool to improve material delivery, facilitate information access, and make learning more engaging for students. This is evident in the use of digital media such as interactive presentations, learning videos, and online learning platforms. Second, teachers' digital pedagogical practices have largely been implemented, although still at a basic level, such as delivering material, giving assignments, and evaluating through digital platforms. The use of digital technology still needs to be improved to make learning more innovative, interactive, and student-centered. Third, teachers face obstacles such as limited technical skills, technological facilities, and a lack of training that supports digital literacy. Overall, the digital literacy of economics teachers at the research site has begun to develop, but still requires improvement through training programs, facility support, and school policies that support the use of digital technology in learning.

Keyword: Case Study; Digital Literacy; Economics Teachers; Senior High Schools

Introduction

The development of digital technology has brought about structural changes in education, requiring teachers not only to master content but also to integrate technology pedagogically into the learning process (Redecker, 2017). This change is transformational because it influences how teachers design, deliver, and implement learning. Within the Education 5.0 framework, digital literacy is a key determinant of learning quality, as it is directly related to teachers' ability to manage information, build digital interactions, and create collaborative and innovative learning (Aeni et al., 2026). In economics learning, the use of digital technology should enable more contextual and applicable presentations of material through simulations, economic data visualizations, and the use of interactive learning platforms. However, research shows that the level of digital literacy of teachers in Indonesia is still suboptimal and has not had a significant impact on transforming learning practices (Gusty et al., 2025; Nurhidayat et al., 2022) This indicates that the presence of technology has not automatically improved the quality of pedagogy, resulting in fundamental problems in the integration process.

This problem is evident in Minahasa Regency. Although most schools have adequate information and communication technology (ICT) infrastructure, its use in learning remains limited to basic functions.

Dominant methods such as conventional lectures indicate that technology has not yet been internalized in teachers' pedagogical strategies. Furthermore, there is a gap between teachers, with younger teachers tending to be more adaptable to the use of digital platforms like Google Classroom, Canva Education, or Kahoot!, while others still struggle to integrate them into their lessons. This situation not only reflects differences in individual abilities but also indicates a systemic failure to develop digital teacher competencies equitably. In other words, there is a mismatch between the availability of technology and the pedagogical capacity to utilize it, reflecting a weak integration of technical and pedagogical competencies (Wiguna, 2023). This gap is further exacerbated by limited ongoing training and the lack of mentoring models based on real-world classroom practice.

Contextually, this problem is also obscured by the unclear definition of digital literacy itself. The initial approach, which viewed digital literacy as a technical skill (Putri, 2025), is no longer adequate to address the demands of 21st-century learning. In contrast, contemporary approaches emphasize that digital literacy encompasses pedagogical, critical, and reflective dimensions (Redecker, 2017). The lack of synchronization between the development of this concept and practice in the field has resulted in partial implementation of digital literacy and a lack of significant impact on the quality of learning. In the context of economics learning, this problem is further complicated because digital literacy should not only support conceptual understanding but also develop critical thinking skills, contextual economic awareness, and digital ethics relevant to local conditions (Loso, 2024). The fact that these aspects have not been integrated indicates a gap between conceptual demands and actual implementation.

Empirically, the research findings in this study remain very clear and have not been widely explored by previous research. First, most digital literacy studies focus on urban contexts, thus not providing a representative picture of conditions in semi-urban areas such as Minahasa Regency. Second, existing research generally only measures the level of technology use or mastery, without deeply analyzing how this technology is involved in contextual and meaningful pedagogical practices. Third, there are not many studies that simultaneously examine the relationship between understanding, development, and implementation of digital literacy within a single, coherent analytical framework. Fourth, contextual factors such as institutional support, school culture, and strengthening competencies among teachers are still under-explored comprehensively. Therefore, the research analysis in this study is not only based on the context of the location, but also on the depth, contextual approach, and integration of the variables studied.

Based on this gap, this study offers a novelty by positioning digital literacy not only as a technical skill, but as a contextual pedagogical practice in economics learning. This study also integrates aspects of understanding, development, and implementation of digital literacy within a comprehensive analytical framework, while considering contextual factors influencing its application. The purpose of this study is to analyze the understanding, development, and implementation of digital literacy among economics teachers in Minahasa Regency, as well as to identify relevant barriers, opportunities, and strengthening strategies. With this approach, this study is expected to not only provide theoretical contributions to the development of the concept of digital literacy but also produce practical, context-based recommendations that can improve the quality of learning in the digital era.

Literature Study

Digital literacy is a person's ability to access, understand, evaluate, and use information from digital media wisely and responsibly (Nurmansyah et al., 2026). Teachers with good digital literacy have a higher level of confidence in using technology and are more ready to adopt digital learning innovations (Falloon, 2020). The provision of technological resources does not automatically guarantee the success of digital

transformation in education. Numerous studies have shown that the effectiveness of digital learning tools is highly dependent on the readiness and digital literacy of teachers as the primary users of the technology (Risdianto et al., 2021). Teachers who lack adequate digital literacy tend to use digital tools only to a limited extent or only as a substitute for conventional media, thus underutilizing technology's potential to improve learning quality (Holm, 2025). This suggests that the provision of technological tools must be balanced with teachers' readiness to integrate technology into their learning practices.

Research Methods

This research employed a qualitative approach with a case study design, aiming to deeply explore the understandings, meanings, processes, and experiences of economics teachers in developing and implementing digital literacy in their teaching practices. This approach was chosen because it captures phenomena holistically within a real-world context (bounded system), allowing for a comprehensive exposure to the social, cultural, and institutional aspects that influence digital literacy (Creswell, 2017). This research was conducted in several public high schools in Minahasa Regency that have implemented digital-based learning, taking into account the school context, such as sub-district centers and semi-urban areas, to ensure richer and more transferable results (Rina & Argi, 2025). The research period was planned from October to November 2025, encompassing the preparation phase, data collection, and initial analysis. Subjects were selected using a purposeful sampling technique with specific criteria: economics teachers who actively use technology, are willing to participate as informants, and represent a wide range of teaching experiences, including junior and senior teachers.

The key informants in this study were 11 economics teachers, supported by 3 students and 3 principals as additional informants. The analysis focused on themes, processes, and meanings related to digital literacy teachers, rather than quantitative variables. These variables included teachers' understanding of digital literacy, technology integration practices in the planning, implementation, and evaluation of economics learning, supporting and inhibiting factors, and various solutions such as the theory-practice solution, the ability solution, the contextual solution, and the generational solution (Redecker, 2017)Data were collected through in-depth semi-structured interviews, lesson observations, and document analysis, including lesson plans, digital materials, and school policies related to ICT, to ensure triangulation (Flick, 2022). The research instruments, including the interview guide, observation protocol, and document checklist, were pre-tested to enhance content validity (Saldana, 2021). The research procedure was carried out in stages, beginning with permission, instrument pilot testing, data collection, transcription and member checking, and then iterative data analysis. Data analysis used an interactive model that included data reduction, data presentation, and drawing and verifying conclusions. The abductive thematic analysis approach allowed for in-depth integration of empirical data and theoretical frameworks (Braun, V., & Clarke, 2021; Miles, M. B., Huberman, M. A., & Saldaña, 2020).

Result

Teachers' Perceptions of Digital Technology

Based on interviews with 11 economics teachers from various high schools in Minahasa Regency, the data obtained indicated a pattern of responses that tended to be similar and repetitive. Therefore, to improve the clarity of the analysis, the data, originally presented in lengthy individual descriptions, was condensed into several main themes. This condensation process was carried out by grouping the similarities in meaning from each informant's statement, resulting in more structured and representative findings. The results of the analysis were then presented in the following table to facilitate understanding of teachers' perceptions regarding the use of digital technology in economics learning.

Table 1. Table. Condensation of Key Findings of Teachers' Perceptions of the Use of Digital Technology

No	Main Theme	Core Findings
1	Improved Conceptual Understanding	Digital technology helps explain abstract economic concepts through media such as videos, graphics, and simulations
2	Increased Student Motivation and Engagement	The use of interactive media and learning applications makes students more active and less likely to get bored
3	Access to Actual and Contextual Information	The internet and digital media enable students to access the latest and most relevant economic information
4	Innovation in Learning	Teachers utilize technology to develop more creative and varied learning methods
5	Flexibility and Independent Learning	Students can learn from various digital sources beyond textbooks
6	Positive Teacher Perceptions	All teachers view digital technology as a necessity in economics learning

Interviews with three principals from SMAN 1 Tompaso, SMAN 1 Tondano, and SMAN 1 Remboken revealed their views on the use of digital technology by economics teachers in their respective schools.

Principal of SMAN 1 Tompaso:

> "…From my observations, most economics teachers have begun utilizing digital technology, for example using PowerPoint-based presentations, instructional videos, or online learning platforms. However, some teachers are still limited in their use due to limited devices or still adapting to the curriculum. In general, they demonstrate an awareness that digital technology can help students better understand economics material."

Principal of SMAN 1 Tondano:

> "…The economics teachers at our school are quite enthusiastic about utilizing digital technology. Some already routinely use Google Classroom, online quiz applications, and interactive materials to support learning. They recognize that digitalization of learning is important, especially for increasing student learning interest. However, some teachers still need further guidance and training to optimize technology use."

Principal of SMAN 1 Remboken:

> "…I see that the economics teachers at this school already have a positive perception of digital technology. They have begun integrating various digital media into their lessons, such as instructional videos, economic simulation applications, and online learning resources. However, the level of utilization varies from teacher to teacher, depending on their experience and comfort with technology. Overall, they understand its benefits for improving the quality of learning."

Table 2. Results of Interviews with Economics Teachers on Their Level of Confidence and Comfort in Using Digital Technology in Learning

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No	School	Informant's Response
1	SMAN 1 Sonder	I feel quite confident using digital devices and platforms in economics learning, especially for presentations, playing learning videos, and using the internet as a learning resource. However, I still sometimes need to learn more to use more complex learning applications.
2	SMAN 1 Lembean Timur	I feel quite comfortable using digital technology in learning activities, especially for finding additional materials and presenting content through digital media. Nevertheless, I still need to adapt to some new learning platforms.
3	SMAN 1 Tondano	I feel quite confident using digital technology because I often use presentations and learning videos in the teaching and learning process. These technologies are very helpful in explaining economic material to students.
4	SMAN 2 Tondano	I feel quite comfortable using digital technology in learning because it helps deliver material in a more engaging way. However, I also continue to improve my skills in using various learning applications.
5	SMAN 3 Tondano	I feel quite confident using digital technology in learning because I am accustomed to using presentation media, learning videos, and the internet to support teaching and learning activities.
6	SMAN 1 Remboken	I feel quite comfortable using digital technology in economics learning. However, there are sometimes challenges when I have to use new platforms that I have never used before.
7	SMAN 1 Kakas	I feel quite confident using digital technology because it greatly helps in delivering economic material to students in a clearer and more engaging way.
8	SMAN 1 Tompaso	I feel quite comfortable using digital technology in learning, especially for explaining material through presentations and videos. However, I still need to improve my ability to use other learning applications.
9	SMAN 1 Tombariri	I feel quite confident using digital technology because I often use it in learning. It makes the learning process more interesting for students.
10	SMAN 1 Pineleng	I feel quite comfortable using digital technology in learning activities because it helps teachers deliver material more effectively.
11	SMAN 1 Eris	I feel quite confident using digital technology in economics learning, although I still sometimes need to learn more about the use of certain learning applications.

Based on interviews, most economics teachers feel quite confident in using digital tools and platforms in their teaching. Teachers are accustomed to utilizing media such as presentations, videos, the internet, and various digital platforms to support the teaching and learning process, which is considered to make learning more engaging and help students better understand economics material. The motivation to use technology is driven by the desire to improve the quality of learning and keep up with current developments. However, obstacles remain, such as network limitations, inadequate facilities, differences in digital skills among teachers, and the potential for misuse of technology by students. Furthermore, training has proven to play a crucial role in increasing teacher confidence. Thus, experience, motivation, and training support are key factors in utilizing digital technology, necessitating increased competency and supporting resources for optimal use.

Digital Pedagogical Practices

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Table 3. Results of Economics Teacher Interviews on the Use of Digital Technology in Planning and Implementing Economics Lessons

No	School	Informant's Response
1	SMAN 1 Sonder	In lesson planning, I usually use digital technology to search for reference materials on the internet and to prepare teaching materials in the form of presentations or other visual media. During classroom implementation, I use a projector to display materials, learning videos, and economic case examples relevant to students' daily lives.
2	SMAN 1 Lembean Timur	I use digital technology in lesson planning by searching for various learning resources from the internet and preparing instructional materials using presentation media. During classroom implementation, technology is used to display materials, learning videos, and the latest economic information to help students better understand the content.
3	SMAN 1 Tondano	In lesson planning, I often use digital technology to prepare teaching materials, find economic case examples, and design engaging learning media. During classroom implementation, I use digital presentations and learning videos to make students more interested in the lesson.
4	SMAN 2 Tondano	I use digital technology in the planning stage to find relevant economic material references and to prepare digital teaching materials. During classroom implementation, I use presentation media, videos, and online learning resources to help explain the material to students.
5	SMAN 3 Tondano	In lesson planning, digital technology greatly helps me find learning resources, prepare teaching materials, and create more engaging learning media. During implementation, I use projectors and the internet to present materials and various examples of economic phenomena occurring in society.
6	SMAN 1 Remboken	I use digital technology in lesson planning to prepare teaching materials and search for additional content from various online sources. During classroom implementation, I use digital presentations and learning videos to help students understand economic material more clearly.
7	SMAN 1 Kakas	In lesson planning, I often use the internet to find reference materials and prepare learning media. During classroom implementation, digital technology is used to present materials, videos, and economic case examples that help students understand the material more concretely.
8	SMAN 1 Tompaso	I use digital technology in lesson planning to prepare materials in presentation form and to find additional learning resources. During classroom implementation, I use projectors and learning videos to help explain relatively complex economic material.
9	SMAN 1 Tombariri	In lesson planning, I use digital technology to prepare teaching materials and search for economic references from the internet. During classroom implementation, technology is used to present materials through presentations and learning videos so that students can more easily understand the content.
10	SMAN 1 Pineleng	I use digital technology in lesson planning to find additional materials and prepare digital learning media. During classroom implementation, technology is used to present materials, videos, and various examples of economic phenomena relevant to students' lives.

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No	School	Informant's Response
11	SMAN 1 Eris	In lesson planning, I use digital technology to search for reference materials, prepare teaching materials, and design learning media. During classroom implementation, technology is used to present materials through presentations and learning videos so that students can more easily understand economic concepts.

Table 4. Results of Interviews with Students and Principals on Digital Platforms Used and Student Responses in Economics Learning

Informant	School	Response
Student 1	SMAN 2 Tondano	"The teacher often uses interactive learning videos and digital graphs. I find the material easier to understand and more engaging compared to just reading textbooks."
Student 2	SMAN 1 Sonder	"The platforms most frequently used are Google Classroom and online quizzes. I can immediately identify my mistakes and understand the material more clearly; learning becomes more interactive."
Student 3	SMAN 1 Kakas	"The teacher uses digital presentations and real-life case examples from the internet. This helps me see how economics is applied in everyday life, making the material easier to understand."
Principal 1	SMAN 1 Tompaso	"From my observation, most economics teachers use PowerPoint, learning videos, and online platforms such as Google Classroom. Students respond enthusiastically and appear to better understand complex economic material. However, some teachers are still adjusting their use of technology to align with the curriculum, so the effectiveness of digital media varies. Overall, digital technology increases interactivity and students' interest in learning."
Principal 2	SMAN 1 Tondano	"Economics teachers regularly use Google Classroom, online quiz applications, and other interactive materials. Student responses are very positive; they actively participate in quizzes and discussions, and demonstrate better understanding of economic concepts. Nevertheless, some teachers still require additional training so that technology use can be more optimal."
Principal 3	SMAN 1 Remboken	"Economics teachers utilize learning videos, economic simulations, digital presentations, and online learning resources. Students respond enthusiastically and are able to learn independently. However, the level of understanding varies, as some students adapt more quickly to technology while others require more guidance. Overall, digital media is effective when properly managed by teachers."

Interview results indicate that digital technology is used intensively in the planning and implementation of economics lessons. Teachers utilize media such as PowerPoint, videos, Google Classroom, and Canva to organize and deliver material, making learning more engaging and easier to understand. This is supported by student responses, who feel that the use of digital media improves understanding, learning interest, and active participation in learning. The principal emphasized that the use of technology is quite effective, although there are still differences in ability among teachers. Data triangulation indicates that digital technology is effective in increasing interactivity and student learning outcomes, but its success is highly dependent on teacher competence, lesson planning, and ongoing training and mentoring support.

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Challenges and Development Needs

Table 5. Results of Economics Teacher Interviews on Obstacles in Integrating Digital Technology in Economics Lessons

School	Interview Results
SMAN 1 Sonder	The informant explained that the main challenge in integrating digital technology in economics learning is limited internet connectivity, which is often unstable during the learning process. In addition, the available technological facilities at the school, such as projectors or other supporting devices, cannot always be used optimally. This condition sometimes forces teachers to readjust the teaching methods that have been previously planned.
SMAN 1 Lembean Timur	The informant stated that the challenges faced in using digital technology include limited internet connectivity and the fact that not all students have adequate digital devices such as smartphones or laptops. This causes the use of digital media in learning to not always be maximized.
SMAN 1 Tondano	The informant explained that the challenges include unstable internet connectivity and differences in students' ability to use digital technology. Some students still experience difficulties when using digital learning platforms and therefore require further guidance from teachers.
SMAN 2 Tondano	The informant stated that the challenges in using digital technology in economics learning include limited technological facilities available at the school and internet connectivity that sometimes experiences disruptions. This can affect the smooth use of digital media in learning.
SMAN 3 Tondano	The informant explained that not all students have adequate access to digital devices to support technology-based learning. In addition, limited internet connectivity is also one of the obstacles in using digital technology in the learning process.
SMAN 1 Remboken	The informant conveyed that the challenges include limited technological facilities available at the school and internet connectivity that is not yet fully stable. This condition sometimes makes the use of digital technology in learning less optimal.
SMAN 1 Kakas	The informant explained that the challenges often faced are unstable internet connectivity and differences in students' ability to use digital technology. Some students still require guidance when using digital learning platforms.
SMAN 1 Tompaso	The informant stated that the challenges in using digital technology include limited internet connectivity and the fact that not all students have adequate technological devices to support digital-based learning.
SMAN 1 Tombariri	The informant explained that the challenges include limited internet access and technological facilities that are not yet fully adequate to support the use of digital technology in learning.
SMAN 1 Pineleng	The informant conveyed that the challenges include internet connectivity that is sometimes unstable and limited technological devices among some students, which can affect the smooth use of digital media in learning.
SMAN 1 Eris	The informant explained that the challenges in integrating digital technology in economics learning include limited internet connectivity and technological facilities that are not yet fully adequate to support digital-based learning.

Discussion

Teachers' perceptions of digital technology cannot be understood simply as positive or negative attitudes, but rather as cognitive constructs formed through the interaction of teachers' experiences, knowledge, and professional social contexts. The positive perceptions demonstrated by economics teachers at public high schools in Minahasa Regency indicate an initial acceptance of technological innovation. Teachers who view technology as a tool that facilitates the delivery of material and enhances student understanding demonstrate a high level of perceived usefulness, which in turn encourages intention to use technology in learning.

Teachers have varying views on the use of technology in the teaching and learning process. The majority of them have a positive view, feeling that technology can increase the interactivity, effectiveness, and appeal of learning. They also feel that the use of digital media can expand learning materials and facilitate the dissemination of student progress. However, some teachers have not fully embraced technology due to limited time, inadequate digital skills, and the technical challenges they face (Anasari & Soekarno, 2025).

This positive perception does not automatically translate into optimal technology integration. A more critical analysis reveals a gap between perception and practice, indicating that technology acceptance remains at a normative level and has not yet been fully internalized in teachers' professional practice. This aligns with research confirming that, in addition to perception, factors such as facilitating conditions and self-efficacy also play a significant role in determining actual technology use (Muzayanah et al., 2025).

Furthermore, the varying levels of teacher readiness in utilizing technology indicate differences in digital literacy and technology-based pedagogical competencies. From a TPACK (Technological Pedagogical Content Knowledge) perspective, teacher competence is determined not only by technological mastery but also by the ability to integrate technology with pedagogical content and strategies. Therefore, a positive perception without adequate TPACK mastery has the potential to result in superficial technology use (Mishra, P., & Koehler, 2006). Psychologically, experience with technology is also closely related to the concept of self-efficacy. Teachers with more extensive experience using technology tend to have higher self-confidence, making them more willing to explore various learning innovations. Conversely, teachers with limited experience tend to experience technostress and implicit resistance to change. Therefore, teachers' perceptions of digital technology should be understood not only as an indicator of their attitudes but also as part of a broader ecosystem of professional competencies. This analysis suggests that strengthening perceptions needs to be accompanied by competency development and systemic support for a substantive digital-based learning transformation.

Conclusion

The findings of this study indicate that the integration of digital technology in economics learning cannot be explained solely through positive teacher perceptions, but must be understood as the result of a complex interaction between cognitive, pedagogical, and structural factors. Theoretically, this study strengthens the Technology Acceptance Model (TAM) and TPACK frameworks by demonstrating that perceived usefulness of technology has not automatically transformed into innovative pedagogical practices. In other words, there is a conceptual gap between technology acceptance and learning transformation, indicating that teacher adoption of technology is still in its early stages and has not yet achieved meaningful integration.

Furthermore, this study contributes to the development of teacher digital literacy studies by emphasizing that digital competence cannot be separated from pedagogical ability. The results indicate that limitations in technology-based learning practices are not solely due to a lack of technical skills, but also due to the

lack of a robust digital pedagogical framework. Thus, this study strengthens the argument in the literature that effective technology integration requires a synergy between technological, pedagogical, and content knowledge (TPACK), supported by teacher self-efficacy in using technology.

In terms of practical implications, the results of this study emphasize the need to shift teacher professional development strategies from a technical approach to a pedagogical-transformative one. Training programs that focus solely on application use will not be sufficient to foster learning innovation. Therefore, contextual, sustainable, and practical classroom training is needed, including strengthening project-based, collaborative, and student-centered learning models. Furthermore, schools need to act as a supporting ecosystem by providing adequate infrastructure, visionary leadership, and an organizational culture that encourages pedagogical experimentation.

Policy implications are also important, particularly in designing educational digitalization strategies that emphasize not only technology distribution but also holistic teacher capacity building. Without integrated, systemic interventions, the use of digital technology risks remaining substitutional and not significantly impacting the quality of learning.

The limitations of this study lie in the limited coverage of informants in a specific region and the use of a qualitative approach that is potentially subject to subjectivity. However, these limitations also open up opportunities for further research to test these findings quantitatively, broaden the research context, and explore more effective intervention models for enhancing technology integration in learning.

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