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TEACHERS' RECEPTION OF TECHNOLOGY FOR PROFESSIONAL COMPETENCE: OVERCOMING BARRIERS IN JUNIOR HIGH SCHOOLS

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Abstract
Technology integration in schools continues to face challenges related to inadequate infrastructure, unstable internet connectivity, and gaps in teachers' digital competencies. This study aims to explore teachers' perceptions and acceptance of technology use in enhancing professional competence amid these constraints in junior high schools. Employing a descriptive qualitative design, the study was conducted at SMPN 1 Salang and SMPN 4 Salang, Simeulue Regency, over a three-month period. Eight participants, including principals, teachers, and school administrators, were selected using purposive sampling based on their direct involvement in educational technology use. Data were collected through in-depth interviews, observations, and document analysis, and analyzed using thematic analysis involving data reduction, data display, and conclusion drawing. The findings revealed that teachers' reception of technology is reflected in three key aspects: participation in technology-based training, shifts in attitudes from resistance to acceptance, and self-initiated learning activities. Despite these positive responses, teachers' efforts remain constrained by limited technological facilities, uneven internet access, and varying levels of digital literacy. The study concludes that positive teacher reception plays a crucial role in strengthening professional competence, although sustained institutional support through continuous training, supportive policies, and infrastructure development is essential to optimize technology integration in schools.

Keywords: teacher digital literacy, professional competence, technology acceptance, junior high schools, educational technology

Introduction

The rapid development of digital technology has significantly influenced educational practices across all levels of schooling, including junior high schools. In this changing educational landscape, teachers play a central role in determining how technology is integrated into learning processes, as their professional competence directly affects instructional quality. Consequently, the ability to utilize educational technology is widely regarded as a fundamental requirement for implementing 21st-century learning, which emphasizes creativity, collaboration, communication, and critical thinking (Lodewijk & ST, 2022).

In line with this perspective, previous studies indicate that appropriate technology use can improve the effectiveness, efficiency, and accuracy of educational processes (Njadat et al., 2021). Nevertheless, evidence suggests that successful technology integration depends not merely on the availability of digital tools, but also on teachers' acceptance, perceptions, and readiness to

incorporate technology into their professional practice. Teacher acceptance has therefore been identified as a critical factor in determining whether technology can meaningfully contribute to the development of professional competence.

Despite the growing emphasis on technology-based professional development, its implementation continues to face significant challenges. Empirical studies consistently report limited digital competence, inadequate infrastructure, and insufficient institutional support as major barriers to effective technology integration (Costan et al., 2021; Knyazeva et al., 2022). In addition to these structural constraints, psychological factors such as resistance to change and low motivation for self-directed learning further shape teachers' responses to technology adoption (Al-Takhayneh et al., 2022; Sharma & Srivastava, 2020). Moreover, the absence of continuous and needs-based training has been identified as a key factor contributing to teachers' difficulties in integrating technology into their professional practice (Ghayyur & Mirza, 2021).

At the same time, research also demonstrates that teachers who hold positive perceptions of educational technology tend to be more adaptive in engaging in professional development activities. These include participation in training programs, experimentation with digital learning innovations, and the use of online platforms for self-development (Stumbrienė et al., 2024; Zhang & Wang, 2025). However, most existing studies have predominantly employed quantitative approaches that focus on measuring attitudes or the frequency of technology use. While valuable, such approaches provide limited insight into how teachers interpret, negotiate, and experience technology adoption within their everyday professional contexts (Davis, 1989; Venkatesh et al., 2003). Consequently, qualitative studies that examine teacher acceptance as a dynamic and contextually situated process—particularly in resource-constrained educational settings—remain scarce (Czerniewicz, 2018; Selwyn, 2021).

These limitations become even more pronounced in rural and under-researched contexts, where technology integration takes place under conditions that differ substantially from those of urban or well-resourced schools. Selwyn (2021) and Czerniewicz (2018) argue that the dominance of research conducted in technologically advantaged environments has resulted in an incomplete understanding of how teachers in marginalized settings adapt to digital transformation. As a result, there remains a significant gap in context-sensitive qualitative studies that explore teachers' technology adoption as a dynamic process shaped by leadership support, professional culture, and self-directed learning practices.

Addressing this gap, the present study situates its investigation in junior high schools in Salang District, Simeulue Regency—an educational context characterized by limited infrastructure and restricted access to ongoing professional development opportunities. This study advances existing research in three important ways. First, it conceptualizes teacher technology acceptance as a processual and interpretive phenomenon rather than a static attitude, emphasizing how acceptance develops through participation in training, attitudinal change, and self-directed learning initiatives. Second, it explicitly links technology acceptance to the development of professional competence, highlighting how digital engagement fosters confidence, collaboration, and adaptive teaching practices. Third, by focusing on a resource-constrained rural context, this study broadens the geographic and contextual scope of educational technology research.

Based on these considerations, this study aims to explore teachers' acceptance of technology in enhancing professional competence by examining how such acceptance is manifested in their daily professional practice. Accordingly, the study is guided by the following research questions: (1) How is teachers' acceptance of technology reflected in their participation in technology-based

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training and its contribution to digital competence and professional collaboration? (2) How does a shift in teachers' attitudes from resistance to acceptance contribute to the development of a more adaptive and innovative school climate? (3) How do self-directed learning activities reflect the development of teachers' professional awareness oriented toward lifelong learning?

By addressing these questions through a qualitative approach, this study seeks to provide an in-depth and contextual understanding of teachers' technology acceptance as a key driver of professional competence development. The findings are expected to contribute theoretically to the discourse on teacher professional development by framing acceptance as a dynamic process, and practically by informing more inclusive and sustainable strategies to support teachers' professional growth in the era of digital transformation, particularly in under-resourced educational settings.

Literature Review

This literature review establishes the theoretical and empirical foundations of the study by examining teachers' technology acceptance as a key determinant of professional competence development in junior high schools. The review synthesizes relevant concepts and findings across four interrelated domains: educational technology and technology acceptance in education, professional development through technology-based learning, teacher competencies in the digital age, and contextual challenges in resource-constrained educational environments. Together, these sections provide a coherent analytical framework for interpreting how teachers engage with technology and how such engagement contributes to their professional growth.

Educational technology and technology acceptance in education

Educational technology is generally defined as the systematic application of digital tools, media, and instructional strategies to enhance teaching and learning processes. Trilling and Fadel (2009) conceptualize educational technology as a supporter of 21st-century competencies, including communication, collaboration, creativity, and critical thinking, emphasizing that technology should support pedagogical transformation rather than merely digitizing traditional practices. This perspective positions educational technology as an integral component of the contemporary learning ecosystem.

Empirical research supports the pedagogical potential of educational technology when meaningfully integrated into classroom practice. Studies show that digital applications and learning platforms can enhance student motivation, engagement, and learning outcomes by fostering interactive, student-centered environments (Li et al., 2024; Molina et al., 2025). Similarly, Yang (2025) found that technology enables teachers to diversify teaching strategies and adapt learning materials to students' needs, thereby increasing instructional flexibility. These findings suggest that the effectiveness of educational technology lies not only in its availability but also in how it is pedagogically implemented.

The success of educational technology integration is closely related to teachers' acceptance of technology. One of the most influential theoretical frameworks in this domain is the Technology Acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use shape an individual's intention to adopt technology (Davis, 1989). In educational contexts, TAM has

been widely applied to explain teachers' technology adoption behavior. Empirical studies confirm that teachers who perceive technology as useful and easy to use are more likely to integrate it into their teaching practices (Akram et al., 2022; Ibrahim & Shiring, 2022).

Beyond individual perceptions, Rogers' (2003) Diffusion of Innovations theory emphasizes that technology adoption is embedded in social systems and influenced by communication channels, institutional culture, and peer interactions. This sociocultural perspective suggests that teacher technology acceptance is not merely a technical decision, but a dynamic process shaped by professional norms, leadership support, and collaborative practices within schools. Consequently, technology acceptance in education must be understood as a multidimensional construct encompassing cognitive, affective, and social dimensions.

In developing and resource-constrained contexts, technology integration in education often faces significant barriers. Studies report that limited infrastructure, unstable internet connectivity, inadequate access to training, and weak institutional support significantly affect teachers' willingness and ability to use technology (Asamoah, 2021; Costan et al., 2021). In addition to structural challenges, psychological factors such as low technology self-efficacy, anxiety, and resistance to pedagogical change further influence teachers' acceptance of digital tools (Knyazeva et al., 2022; Tondeur et al., 2017). The interaction between infrastructural limitations and psychological readiness often results in partial or superficial technology adoption rather than deep pedagogical integration.

Professional development and technology-based learning

Professional development is widely recognized as a key mechanism for improving teacher competence and teaching quality. According to Desimone (2009), effective professional development is characterized by content focus, active learning, coherence, sustained duration, and collective participation. In the digital era, technology-based professional development has gained attention as a strategic approach to equipping teachers with competencies needed to respond to evolving educational demands, including digital pedagogy, collaboration, and data-informed instruction.

From a theoretical perspective, Knowles' (1984) theory of adult learning (andragogy) emphasizes that teachers, as adult learners, are autonomous, goal-oriented, and motivated when learning activities are relevant to their professional contexts. Technology-based professional development aligns with this perspective by providing flexible, contextualized, and practice-oriented learning opportunities that enable teachers to construct knowledge through experience and reflection. Yusuf et al. (2022) found that technology-based training programs can stimulate pedagogical innovation and enhance professional competence when aligned with teachers' needs and contextual realities.

However, empirical studies conducted in developing regions highlight persistent limitations in the implementation of technology-based professional development. Amemasor et al. (2025) reported that many training programs lack continuity, structured follow-up mechanisms, and contextual relevance, thereby limiting their long-term impact on classroom practice. These findings align with Guskey's (2002) model of teacher change, which argues that professional development is effective only when it leads to changes in classroom practice and observable improvements in student learning outcomes. Consequently, participation in formal training alone is insufficient to ensure sustained professional growth without systemic support and reflective practice.

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Recent research further demonstrates that the effectiveness of professional development is closely linked to teachers' acceptance and interpretation of technology within their professional environments. Based on the Technology Acceptance Model developed by Davis (1989), teachers' perceptions of usefulness and ease of use significantly influence their willingness to integrate digital tools into teaching practice. Teachers who demonstrate positive attitudes toward technology are more likely to experiment with digital tools, collaborate with colleagues, and apply newly acquired competencies in instructional activities (Yusuf et al., 2022).

From this perspective, technology acceptance functions as a mediating factor determining whether professional development initiatives translate into meaningful pedagogical practice. Examining professional development through the lens of technology acceptance therefore provides a more comprehensive understanding of how teachers internalize, adapt, and operationalize digital competencies in their daily professional work, particularly in contexts characterized by limited institutional infrastructure and support.

Teacher competencies and technology integration

Teacher competence is generally conceptualized as a multidimensional construct encompassing pedagogical, professional, personal, and social capacities required for effective teaching. In Indonesia, this conceptualization is formally articulated in Law Number 14 of 2005 concerning Teachers and Lecturers, which defines teacher competence as the integration of pedagogical, personal, professional, and social dimensions. This regulatory framework positions teacher competence as a fundamental requirement for ensuring educational quality and professional accountability.

In the context of 21st-century education, the concept of teacher competence has expanded to include digital literacy, technological adaptability, and innovation capacity. Scholars argue that contemporary teachers are expected not only to master subject matter and pedagogy but also to meaningfully integrate technology and respond to rapid technological change (Santosa & Rahmawati, 2022; Soghomonyan & Karapetyan, 2023). This perspective conceptualizes teacher competence as a dynamic and evolving capacity rather than a fixed set of skills.

Empirical evidence suggests that teachers with higher levels of professional competence tend to demonstrate greater readiness to adopt educational technology (Ghalia & Karra, 2023). However, competence alone does not guarantee effective technology integration. Studies show that in contexts with limited infrastructure, teachers' acceptance of technology mediates the relationship between competence and actual technology use (Alieto et al., 2024; Gurer, 2021; Ofem et al., 2025). These findings highlight that positive attitudes, motivation, and willingness to learn are essential for translating competence into practice.

Furthermore, research on self-directed learning emphasizes the role of intrinsic motivation in sustaining professional growth. Teachers who engage in self-directed learning activities—such as exploring online resources, participating in voluntary webinars, and collaborating with colleagues—demonstrate stronger professional awareness and adaptability (Kanya et al., 2021; Nkolika, 2024). This orientation aligns with the concept of lifelong learning, which views professional competence as a continuous, self-initiated process.

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Methodology

Research design and approach of the study

This study employed a descriptive qualitative research design to examine teachers' reception of technology use in relation to the development of professional competence. A qualitative approach was selected because it enables an in-depth understanding of social phenomena through direct engagement with research participants and their lived experiences (Creswell & Creswell, 2017). Specifically, this design allowed the researchers to systematically describe how teachers experience, interpret, and respond to technology integration within their professional practice.

The descriptive qualitative design was considered appropriate for capturing the complexity of teachers' technology acceptance, including variations in digital understanding, resistance to change, and individual initiative in adopting technology. Rather than measuring technology use quantitatively, this approach emphasizes meaning-making processes and contextual influences that shape teachers' professional development.

Research site and participants

The research was conducted at two public junior high schools in Simeulue Regency, Aceh Province, Indonesia: SMPN 1 Salang and SMPN 4 Salang. Simeulue Regency is an island district located off the western coast of Aceh and is characterized by geographical isolation, limited transportation access, and uneven development of digital infrastructure. These contextual conditions directly affect internet connectivity, access to digital devices, and the consistency of technology use in schools.

SMPN 1 Salang is located in the sub-district administrative center and serves students from both coastal and rural communities. The school has begun implementing educational technology, such as Learning Management Systems (e.g., Google Classroom) and digital administrative platforms; however, its use remains inconsistent due to unstable internet access and limited school-owned devices. SMPN 4 Salang, situated in a more remote area, faces greater challenges related to weak internet signals, limited technological facilities, and teachers' varying levels of digital competence. Despite these constraints, both schools have initiated technology use in learning and school administration, making them relevant sites for examining teachers' reception of technology in resource-limited contexts.

Participants were selected using purposive sampling to ensure alignment with the research objectives. A total of eight participants were involved, consisting of school principals, teachers, and school operators who were directly engaged in the use and management of educational technology. Their diverse roles enabled the study to capture multiple perspectives on technology adoption and professional development within the school context. Data collection was conducted over a three-month period, allowing sufficient time for in-depth interviews, observations, and document review.

Data collection

Data were collected over a three-month period using in-depth interviews, classroom observations, and document analysis to obtain a comprehensive understanding of teachers' acceptance of technology for professional development. The use of multiple data sources was intended to enhance data credibility through methodological triangulation.

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In-depth interviews were conducted using a semi-structured interview guide developed based on theories of technology acceptance and teacher professional development. The interviews focused on teachers' acceptance of technology as reflected in their perceptions, understandings, and evaluations of technology integration. These dimensions also served as empirical indicators of teachers' engagement in professional development. Prior to data collection, the interview guide was reviewed and refined to ensure clarity, relevance, and alignment with the research objectives.

Classroom observations were carried out to examine the actual implementation of technology in teaching and learning activities. The researcher acted as a non-participant observer, recording field notes related to teaching practices, the use of digital tools, and teacher–student interactions involving technology. These observations provided contextual and behavioral data that complemented the interview findings.

Document analysis involved reviewing school-related documents, including lesson plans, technology-based training materials, professional development reports, and documentation of school activities related to technology integration. These documents were used to corroborate interview and observation data and to identify institutional policies and supports influencing teachers' use of technology. In addition to primary data, relevant literature was consulted as secondary data to strengthen conceptual interpretation and situate the findings within broader research on educational technology and teacher professional development.

Data analysis

Data analysis in this study followed the qualitative analysis framework proposed by Miles (1994), which consists of data reduction, data display, and conclusion drawing and verification. During the data reduction stage, interview transcripts, observation field notes, and relevant documents were carefully reviewed and coded. The researcher selected, simplified, and categorized data that were directly related to the research focus, particularly teachers' perceptions, understandings, and evaluations of technology use, as well as factors that supported or hindered professional competence development.

In the data display stage, the reduced data were organized into tables, comparative matrices, and descriptive narratives. This organization enabled systematic comparison across participants and data sources and facilitated the identification of recurring patterns and relationships among psychological, institutional, and contextual factors influencing teachers' acceptance of technology.

Finally, conclusions were drawn through the interpretation of themes and patterns emerging from the data. The conclusion-drawing process was iterative and continuously informed by the data analysis stages to ensure that interpretations were grounded in empirical evidence rather than researcher assumptions.

Trustworthiness

To ensure the trustworthiness of the qualitative findings, this study employed several established strategies, including source triangulation, method triangulation, and member checking. Source triangulation was achieved by comparing data obtained from principals, teachers, and school operators to capture diverse perspectives on technology use within the school context. Method triangulation was conducted by cross-verifying findings from interviews, classroom observations, and document analysis.

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Member checking was carried out by sharing preliminary interpretations with selected participants to confirm the accuracy and credibility of the findings. Participants were invited to clarify or validate the researcher's interpretations based on their experiences. These procedures were applied to enhance the credibility, dependability, and confirmability of the study and to minimize potential researcher bias, consistent with qualitative research standards (Creswell & Creswell, 2017).

Findings

The findings of this study respond directly to the research purpose by illustrating how teachers' reception of technology use contributes to the improvement of their professional competence. The results are presented systematically and supported with explanations and tables to strengthen interpretation.

Table 1. *List of Coding*

Position	Code
Principal of SMP Negeri 1 Salang	AN (K1)
Principal of SMP Negeri 4 Salang	RJ (K2)
Teacher 1 of SMP Negeri 1 Salang	WF
Teacher 2 of SMP Negeri 1 Salang	EF
Teacher 3 of SMP Negeri 1 Salang	AM
Teacher 1 of SMP Negeri 4 Salang	RI
Teacher 2 of SMP Negeri 4 Salang	SR
Teacher 3 of SMP Negeri 4 Salang	RA

Teachers' participation in technology-based training

Teachers' participation in technology-based training emerged as a central indicator of their acceptance of educational technology. Most teachers at SMPN 1 Salang and SMPN 4 Salang demonstrated strong enthusiasm in attending training programs organized by schools and external institutions. This participation reflects teachers' awareness of the importance of technological competence and their willingness to improve professional skills aligned with 21st-century learning demands.

Table 2. *Description of active interviews in technology-based training*

No	Informant	School of Origin	Description
1	AN (K-1)	SMPN 1 Salang	"We always encourage teachers to participate in digital training, because it is the main capital in developing learning."
2	RJ (K-2)	SMPN 4 Salang	"We strive to facilitate teachers so they don't miss out on technological developments, even though internet connection can sometimes be an obstacle."
3	WF	SMPN 1 Salang	"At first it was a bit difficult to follow the training, but after getting used to it, I became more confident in using the learning application."
4	EF	SMPN 1 Salang	"The training made me realize that technology can make student evaluation easier, for example with online quizzes."

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5	AM	SMPN 1 Salang	"I found the technology training very helpful, especially in creating interactive teaching media that is more engaging for students."
6	RI	SMPN 4 Salang	"I'm taking online training, even though the signal is sometimes weak. But I still try because it's important for learning."
7	SR	SMPN 4 Salang	"The training provided new insights, now I can use Google Forms for daily assessments."
8	RA	SMPN 4 Salang	"After participating in the training, I became more enthusiastic about trying new applications even though I was learning slowly at first."

Analysis of interview data indicates that both principals actively encouraged teachers to participate in digital training despite infrastructural constraints, particularly unstable internet access. This leadership support created a sense of institutional legitimacy that motivated teachers to remain engaged in professional development activities.

Teachers reported that training participation not only enhanced technical knowledge but also increased confidence in applying technology in instructional practices. Initial difficulties were gradually replaced by practical benefits, such as designing interactive media, conducting digital assessments, and utilizing applications like Google Forms and online quizzes. This pattern suggests a shift from passive technology use to active professional engagement. To further consolidate these findings, thematic analysis was conducted.

Table 3. *Thematic analysis of participation in technology-based training*

Analytical Focus	Theme	Description	Supporting evidence (Informants)
Teacher Reception	Positive attitude toward technology-based training	Teachers demonstrate high enthusiasm and willingness to participate in digital training programs organized by schools and external institutions	AN, RJ, RI, RA
Institutional Support	Principal leadership and structural facilitation	Principals actively encourage participation and provide facilitation despite infrastructure limitations	AN, RJ
Professional Competence	Improvement of digital teaching skills	Training enhances teachers' ability to create interactive media and conduct digital-based assessments	EF, AM, SR
Mindset Change	Increased confidence and active learning orientation	Teachers shift from initial difficulty to confidence and initiative in exploring new technologies	WF, RA

Theme 1: Positive attitude toward technology-based training

The findings reveal that teachers generally show a positive reception toward technology-based training. High enthusiasm is reflected in teachers' willingness to participate in both offline and online programs, even when facing technical constraints such as unstable internet connections. This attitude indicates teachers' awareness of the importance of technology mastery in responding to contemporary learning demands.

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Theme 2: Principal leadership and structural facilitation

Principal support emerges as a key theme influencing teachers' participation. School leaders consistently encourage teachers to engage in professional development activities and attempt to provide necessary facilities. This structural support strengthens teachers' motivation and reduces resistance to adopting new technologies.

Theme 3: Improvement of digital teaching skills

Technology-based training contributes directly to the development of teachers' professional competence. Teachers report improved skills in designing interactive learning media and implementing digital assessments such as online quizzes and Google Forms. These competencies enhance instructional effectiveness and assessment efficiency.

Theme 4: Increased confidence and active learning orientation

Participation in training fosters a gradual shift in teachers' mindset. Although some teachers initially experienced difficulty, continuous engagement led to increased confidence and willingness to experiment with new applications. This reflects a transformation from passive technology users to active learners who independently develop their digital skills.

Overall, the thematic analysis demonstrates that participation in technology-based training not only strengthens teachers' digital competencies but also promotes professional collaboration and self-directed learning. Strong leadership support, combined with positive teacher attitudes, creates a conducive environment for sustainable professional development. These findings confirm that technology-based training plays a strategic role in enhancing teachers' professional competence and adaptability in the digital era.

Shifts in teachers' attitudes from resistance to acceptance contribute to a more adaptive and innovative school climate

The documentation data describes a series of activities that reflect the school's commitment to improving the quality of education through the use of technology. At SMP Negeri 1 Salang, the training atmosphere was seen involving teachers with great enthusiasm, accompanied by speakers who provided in-depth explanations about technology integration in learning. A similar thing was also seen at SMP Negeri 4 Salang, where the principal officially opened the training activities, followed by the active participation of teachers who were enthusiastic about mastering new skills in the field of information technology. It does not stop at training, teachers who have acquired knowledge then immediately put the results into practice in learning activities, thus creating continuity between theory and real implementation. This documentation shows the harmonious synergy between the school, the material providers, and the teachers in creating an educational ecosystem that is adaptive to technological developments.

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Table 4. *Thematic Analysis of Shifts in Teachers' Attitudes Toward Technology Integration*

Analytical Dimension	Theme	Documentation Evidence	Interpretation
Attitudinal Change	Shift from resistance to acceptance	Teachers actively participating in ICT training at both schools	Teachers demonstrate openness and readiness to adopt technology
Leadership Support	Principal's managerial commitment	Principals officially opening training activities	Leadership presence symbolizes institutional support for change
Professional Engagement	High enthusiasm during training	Teachers focused and actively involved in training sessions	Positive attitudes strengthen professional motivation
Knowledge Transfer	Guided mentoring and facilitation	Trainers delivering in-depth material	Structured guidance supports meaningful learning
Practice Orientation	Immediate classroom implementation	Teachers directly applying technology in teaching	Acceptance is translated into real instructional practice
School Climate	Adaptive and innovative learning ecosystem	Synergy between leadership, trainers, and teachers	Technology use becomes part of school culture, not a temporary program

The thematic analysis of documentation data indicates a clear shift in teachers' attitudes toward technology use, from initial resistance to growing acceptance. This shift is reflected in teachers' enthusiastic participation in training activities and their willingness to directly apply newly acquired digital skills in classroom practices. Such behavior suggests that technology is no longer perceived as a burden, but as a valuable tool for improving instructional quality.

The presence of school principals in officially opening training activities represents strong managerial and structural support, which plays a crucial role in legitimizing and sustaining change. Leadership involvement helps create a supportive environment that encourages teachers to adapt and innovate. In addition, the role of trainers in providing guided and practical instruction strengthens the transfer of knowledge, enabling teachers to bridge the gap between theory and classroom application.

Furthermore, the immediate implementation of training outcomes in teaching practices confirms the continuity between professional development and real practice. This continuity contributes to the formation of an adaptive and innovative school climate, where technology integration becomes embedded in daily routines rather than remaining a ceremonial or short-term initiative. Overall, the documentation evidence demonstrates a positive synergy between leadership, training, and teacher commitment in fostering sustainable educational transformation in the digital era.

Based on table 4, there are several series of documentation presented showing that SMP Negeri 1 Salang and SMP Negeri 4 Salang have shown seriousness in integrating technology as a means of improving the quality of learning. The role of the principal who was present to open the activity was a symbol of managerial commitment, while the enthusiasm of the teachers who participated in the training reflected a readiness to continue learning and adapting. The presence of material providing guidance also adds to the strength of the training process, so that teachers not only understand theory but also gain practical experience. Furthermore, the application of training results directly in the classroom shows that there is real follow-up that bridges the gap between training and practice. This synergy builds a learning ecosystem that is not only responsive

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to technological developments, but also fosters a culture of professionalism among educators. Thus, the use of technology in both schools is no longer just a temporary activity, but has become a strategic step towards sustainable educational transformation.

Documentation of activities at SMP Negeri 1 Salang and SMP Negeri 4 Salang also shows a training atmosphere filled with the spirit of improving the quality of education through the use of technology. At SMP Negeri 1 Salang, the teachers appeared to be following the training with great enthusiasm, accompanied by the presenter who explained the material in depth regarding the use of technology in learning. Meanwhile, at SMP Negeri 4 Salang, the principal officially opened the training activities which were then followed by the active participation of teachers who were enthusiastic about absorbing new skills in the field of information technology. This enthusiasm does not stop at the training process, but also continues with real implementation in the classroom, where the trained teachers directly practice using technology to support teaching and learning activities. This entire series of documentation illustrates the synergy between leadership, mentoring, and teacher participation in realizing more adaptive learning in the digital era.

Interpretation of the documentation shows that the training efforts at SMP Negeri 1 Salang and SMP Negeri 4 Salang were not merely ceremonial activities, but rather a real strategy in fostering a culture of technology use in schools. The principal's involvement in opening the event represents structural support, while the enthusiasm of teachers who participated and put the training results into practice signifies the emergence of professional awareness for transformation. The presence of tutors who provide guidance also strengthens knowledge transfer, so that teachers are able to bridge the gap between theory and practice of digital-based learning. Furthermore, direct implementation in the classroom confirms the continuity from training to application, which shows that technology has been positioned as an important instrument in improving the quality of learning. Thus, this documentation can be interpreted as evidence of positive synergy between leadership, training, and teacher commitment in building a progressive educational ecosystem that is relevant to the demands of the digital era.

Self-Initiated Learning Activities Demonstrate The Development Of Professional Awareness Oriented Toward Lifelong Learning

In addition to attending formal training, some teachers show initiative to develop technological skills independently. This phenomenon shows that intrinsic motivation has an important role in shaping teacher professionalism. Teachers who take the initiative to learn independently tend to be more adaptive to change, dare to try new applications, and do not wait for direction from the school. This is in line with the concept of self-directed learning which positions teachers as lifelong learners. The independent learning initiatives undertaken by teachers at SMPN 1 Salang and SMPN 4 Salang are evident in their efforts to seek online references, participate in online training voluntarily, and collaborate with colleagues to solve technical challenges they face.

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Tabel 5. *Description of interviews with teachers who initiated independent learning*

No.	Informant	School of Origin	Description
1	AN (K-1)	SMPN 1 Salang	"I often see teachers trying to learn by themselves using applications, even without being asked they try to create digital learning media."
2	RJ (K-2)	SMPN 4 Salang	"Some teachers here are used to searching for material on the internet themselves, and they even share it with other fellow teachers."
3	AM	SMPN 1 Salang	"If there's a new app, I usually immediately look for a tutorial on YouTube so I can use it in class."
4	WF	SMPN 1 Salang	"Sometimes I take part in free webinars outside of school hours, to better understand how to teach with technology."
5	EF	SMPN 1 Salang	"I often ask other teachers about new apps they're using, and then I try to learn them too. For example, filling in student report card grades using Google Sheets."
6	RI	SMPN 4 Salang	"If the network is good, I like to take online training even though it is not facilitated by the school."
7	SR	SMPN 4 Salang	"I am used to reading articles or digital modules to add more interesting teaching materials."
8	RA	SMPN 4 Salang	"Independent learning is important, so I made a habit of trying to create my own digital questions even though it was difficult at first."

Table 5 presents interview excerpts that illustrate teachers' self-initiated learning practices in developing technological competence. The data show that teachers from both SMPN 1 Salang and SMPN 4 Salang actively engage in independent learning activities, such as exploring digital applications, searching for online tutorials, participating in voluntary webinars, reading digital modules, and collaborating with colleagues to acquire new technological skills. These practices are undertaken without direct institutional instruction, indicating a strong sense of intrinsic motivation and professional responsibility.

Furthermore, the interview data suggest that self-initiated learning is not limited to individual efforts but is often reinforced through collegial interaction and knowledge sharing among teachers. This pattern reflects the emergence of a professional learning culture in which teachers position themselves as active learners who continuously adapt to technological change. Overall, the evidence in Table 5 supports the interpretation that independent learning activities serve as a key foundation for fostering lifelong learning orientations and strengthening teachers' professional competence in resource-constrained school contexts.

Table 6. *Thematic Analysis of Self-Initiated Learning and Lifelong Learning Orientation*

Analytical Indicator	Code / Category	Theme	Supporting Evidence (Interview Excerpts)	Interpretation
Evaluation	Independent exploration of digital resources	Self-initiated digital learning	"I usually immediately look for a tutorial on YouTube" (AM); "I am used to reading articles	Teachers actively seek learning resources without institutional instruction, indicating intrinsic motivation

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			or digital modules" (SR)	
Evaluation	Voluntary participation in online training	Autonomous professional development	"I take part in free webinars outside of school hours" (WF); "I like to take online training even though it is not facilitated by the school" (RI)	Teachers perceive professional growth as a personal responsibility
Evaluation	Peer collaboration	Collegial knowledge sharing	"They share it with other fellow teachers" (RJ); "I often ask other teachers about new apps" (EF)	Independent learning is strengthened through collaborative professional culture
Evaluation	Experimentation with new technology	Adaptive and innovative mindset	"Trying to create digital learning media without being asked" (AN); "Trying to create my own digital questions" (RA)	Teachers demonstrate courage to experiment, reflecting professional confidence
Evaluation	Awareness of continuous learning	Lifelong learning orientation	Consistent independent learning habits across schools	Teachers position themselves as lifelong learners rather than passive program recipients

The thematic analysis indicates that teachers at SMPN 1 Salang and SMPN 4 Salang demonstrate strong self-initiated learning behavior in developing technological competence. This initiative is reflected in their consistent efforts to independently search for digital learning resources, voluntarily participate in webinars, experiment with new applications, and collaborate with colleagues to overcome technical challenges.

These patterns signify a shift in professional awareness, where teachers no longer rely solely on formal training programs but recognize continuous learning as an inherent part of their professional identity. Such behavior aligns closely with the concept of self-directed and lifelong learning, which emphasizes autonomy, intrinsic motivation, and adaptability in professional development. Consequently, independent learning initiatives serve as a strategic foundation for strengthening teachers' digital competence and fostering a more adaptive and innovative educational environment.

The data in table 6 confirms that teachers at SMPN 1 Salang and SMPN 4 Salang have a strong initiative to learn independently in utilizing technology. They don't just wait for directions from the school, but try to find alternative learning resources, whether through online tutorials, webinars, or discussions with students and colleagues. This pattern shows professional awareness that increasing competence does not solely depend on formal programs, but also on individual motivation to continue adapting. Thus, the teachers' learning independence is an important factor that strengthens the use of technology in learning in both schools.

The research findings show that teachers at SMPN 1 Salang and SMPN 4 Salang demonstrate high independence in developing technological competencies. Some teachers reported consistently seeking out online learning resources such as video tutorials and digital modules, while others actively participated in webinars and discussion forums with the teacher

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community outside of school. This initiative was born from the realization that the ability to master technology is an absolute necessity in the modern learning process. There are even teachers who dare to conduct independent experiments, such as trying new applications for presentations or interactive exercises with students. This attitude confirms that intrinsic motivation and a sense of professional responsibility are the main drivers for teachers not to rely entirely on official programs from the government or schools.

The tendency of teachers to learn independently in utilizing technology can be interpreted as a strong indicator of a shift in the paradigm of professionalism. Teachers no longer position themselves as passive recipients of educational policies, but as active actors who construct knowledge through independent experience. This phenomenon is in line with the concept of lifelong learning which emphasizes that increasing competence is a continuous process and is not limited to formal spaces. With this initiative, teachers have the potential to accelerate adaptation to technological developments and minimize the digital divide that still exists in the school environment. Further interpretation shows that this culture of independent learning can be a strategic asset for building an educational ecosystem that is more adaptive, innovative, and responsive to the demands of the times.

Discussion

The first finding of this study demonstrates that teachers' acceptance of technology is clearly reflected in their active participation in technology-based training programs. Teachers at SMPN 1 Salang and SMPN 4 Salang showed high enthusiasm for engaging in both school-organized and externally facilitated training, despite infrastructural constraints such as limited internet connectivity. This participation reflects teachers' awareness of the importance of technological mastery in responding to the demands of 21st-century learning and indicates a deliberate effort to enhance their professional competence through practical and relevant learning experiences.

Importantly, engagement in technology-based training not only enhanced teachers' digital skills—such as developing interactive learning media and conducting digital assessments—but also fostered increased confidence and a more proactive learning orientation. This process was strongly supported by consistent encouragement and facilitation from school principals. These findings are consistent with previous studies showing that technology-oriented professional development enhances teachers' digital competence and promotes collaborative professional learning (Ghamrawi et al., 2024; Zhao et al., 2024). In line with the Technology Acceptance Model, participation in training strengthens perceived usefulness and perceived ease of use, thereby increasing teachers' willingness to adopt technology in their professional practice (Ibrahim & Shiring, 2022). However, this study further confirms that training initiatives are effective only when accompanied by sustained institutional support and follow-up, reinforcing arguments that continuous professional development is more impactful than short-term or incidental training programs (Akram et al., 2022).

The second finding reveals that shifts in teachers' attitudes from initial hesitation or resistance toward acceptance contribute to the development of a more adaptive and innovative school climate. This finding highlights the psychological dimension of technology acceptance, indicating that teachers' attitudes are not static but can evolve through institutional reinforcement, peer interaction, and experiential learning. This pattern aligns with Rogers' (2003) Diffusion of

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Innovations theory, which emphasizes that adoption is shaped by individual attitudes within broader social and organizational systems rather than by technical factors alone.

Unlike studies that portray resistance as a persistent barrier associated with age or low digital literacy (Deniz, 2025), this study demonstrates that teachers are able to renegotiate their attitudes when supported by strong school leadership and a collaborative professional environment. Nevertheless, consistent with Patni and Wardani (2024), the findings also suggest that positive attitudes alone are insufficient in the absence of adequate infrastructure. This highlights the interplay between psychological readiness and structural conditions in shaping meaningful and sustained technology acceptance.

The third finding suggests that self-directed learning activities represent the emergence of a professional consciousness oriented toward lifelong learning. Teachers who independently seek digital resources, participate in online learning opportunities, and collaborate informally with colleagues demonstrate intrinsic motivation to continuously improve their professional competencies. This finding supports previous research indicating that self-directed learning enhances adaptability and professional responsibility in contexts of technological change (Husamah et al., 2025).

In resource-constrained environments, self-directed learning functions as a strategic response to limited access to formal professional development, enabling teachers to bridge gaps in institutional support. However, as noted by Lee and Chang (2025), reliance on self-directed learning without adequate institutional reinforcement may widen disparities among teachers. Therefore, this study underscores the importance of complementing individual learning initiatives with equitable policies, leadership support, and improved access to technological resources to ensure inclusive and sustainable professional development.

Conclusion

This study concludes that teachers' acceptance and utilization of educational technology at SMPN 1 Salang and SMPN 4 Salang are strongly shaped by active participation in technology-based training, supportive school leadership, and self-initiated learning behaviors. Teachers who engage in both school-facilitated and externally organized training demonstrate improved digital competencies, increased confidence, and a shift toward a more proactive and adaptive professional mindset. Technology-based training not only enhances teachers' technical skills—such as developing interactive learning media and implementing digital assessments—but also fosters professional collaboration and orientations toward continuous learning.

The findings further indicate that school principals play a critical role in sustaining teachers' engagement with technology by providing encouragement, facilitation, and symbolic managerial support, even within contexts constrained by limited infrastructure. Such leadership support contributes to a conducive professional environment that legitimizes innovation, reduces resistance to technological change, and supports the development of an adaptive and innovative school climate.

Beyond formal training, teachers' self-initiated learning activities emerge as a significant indicator of professional awareness oriented toward lifelong learning. Teachers independently seek digital resources, voluntarily participate in online training, collaborate with colleagues, and experiment with new technologies in classroom practice. These practices reflect a paradigm shift

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from reliance on formal programs toward self-directed professional growth driven by intrinsic motivation and professional responsibility.

Overall, the study confirms that effective technology integration in schools is achieved through the interaction of structured professional development, strong leadership commitment, and teachers' autonomous learning initiatives. Together, these interconnected factors form a strategic foundation for strengthening teachers' professional competence and for building a sustainable, adaptive, and future-oriented educational ecosystem in the digital era.

Recommendations/Implications

The findings of this study have important implications for educational practice and policy. At the school level, school leaders are encouraged to design technology-based professional development programs that are continuous, practice-oriented, and responsive to teachers' needs, rather than relying on one-off training sessions. Establishing collaborative learning spaces, peer mentoring systems, and communities of practice can strengthen teachers' acceptance of technology and support its sustained integration into instructional practices.

At the policy level, educational authorities should move beyond a primary focus on infrastructure provision by developing policies that also support teachers' psychological readiness, professional motivation, and equitable access to digital learning opportunities. Institutional support mechanisms—such as allocating time for professional learning, recognizing self-initiated learning activities, and providing ongoing technical assistance—are essential to prevent disparities in technology mastery and to promote inclusive professional development across schools.

For future research, it is recommended that studies involve more diverse samples across geographical and institutional contexts, employ mixed-methods or longitudinal designs, and examine the long-term impact of teachers' technology acceptance on instructional practices and student learning outcomes. Such research would enhance the generalizability of findings and provide deeper insights into the sustainability of technology-based professional development initiatives.

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