



Teachers' Digital Competence and Self-Efficacy: The Mediating Role of Technology Integration in Tangub City Division

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Abstract

Background and Aim: The growing integration of technology in education has highlighted the need for teachers to develop strong professional digital competence to enhance instructional quality and teaching confidence. In the DepEd Tangub City Division, teachers are increasingly expected to use digital technologies for instruction, assessment, communication, and learner support. However, differences in access to digital resources, ICT-related training, and actual classroom technology use may affect effective technology-supported teaching. This study aimed to examine the relationship among teachers' professional digital competence (TPDC), use of instructional and communication tools (TUICT), and self-efficacy (SE) among public school teachers in DepEd Tangub City Division. It also determined whether TUICT mediates the relationship between TPDC and SE.

Materials and Methods: This study used a quantitative descriptive-correlational design involving 217 public school teachers selected through non-probability convenience sampling. Data were gathered using adapted and validated standardized instruments measuring TPDC, TUICT, and SE. Content validity was confirmed through expert review, while reliability testing showed acceptable internal consistency (Cronbach's $\alpha = 0.70$). Mean and standard deviation were used to describe variable levels. Since the data were non-normally distributed, Spearman's rank correlation was applied to test relationships among variables. Mediation analysis was also conducted to determine the mediating role of TUICT. Ethical protocols, including informed consent, confidentiality, and voluntary participation, were strictly observed.

Results: Results showed that teachers had a very high level of digital competence ($M = 4.53$, $SD = 0.566$) and self-efficacy ($M = 4.39$, $SD = 0.485$), while their use of instructional and communication tools was high ($M = 4.16$, $SD = 0.614$). Significant positive relationships were found between TPDC and TUICT ($\rho = 0.742$, $p < .001$), TPDC and SE ($\rho = 0.609$, $p < .001$), and TUICT and SE ($\rho = 0.559$, $p < .001$). Mediation analysis revealed that TUICT partially mediated the TPDC–SE relationship, with a significant indirect effect ($\beta = 0.159$, $p < .001$), representing 33.6% of the total effect. The direct effect of TPDC on SE remained significant ($\beta = 0.314$, $p < .001$).

Conclusion: Teachers' professional digital competence significantly contributes to both technology use and self-efficacy. Although instructional and communication tools strengthen self-efficacy, digital competence remains the strongest predictor. The findings suggest that professional development should go beyond technical training and focus on holistic digital competence to improve teachers' confidence and effectiveness in technology-rich learning environments.

Keywords: Digital Competence, Instructional Tools, Self-efficacy, Mediation, Teachers

Introduction

The integration of digital technologies in education has fundamentally changed the way teachers practice their profession and how they learn and teach in the world of education, which has led to the concept of teachers' professional digital competence (TPDC) becoming a vital part of effective educational practice. Teachers must be not only technically skilled, but they must also use digital tools efficiently to improve learning, assessment, communication, and classroom management (Redecker, 2017). TPDC is the sum of knowledge, skills, and attitudes needed to be applied in effective ways in professional teaching environments in relation to the use of digital technologies (Aydin et al., 2024). Similarly, teachers' self-efficacy, which refers to their confidence in their ability to effectively engage in teaching-related activities, is a key factor in technology's adoption and teacher effectiveness (Bandura, 1997).

As digital learning continues to be a focus in educational systems in the Philippines, the need for teachers who are comfortable using digital tools in their lessons has risen. The public-school teachers



in Tangub City Division are expected to maximize and take advantage of any technology they can in the teaching and learning process, even though there are differences in technology access, professional development, and technology integration practices. Such realities call for an understanding of the role of teacher digital competence in supporting teachers' confidence and effectiveness in the use of technology in teaching.

Recent research has demonstrated that there are positive correlations between teachers' digital competence, technology integration, and self-efficacy (Nguyen & Habók, 2024; Tondeur et al., 2023). Previous studies have investigated these variables individually or just between two variables. However, there is not much empirical evidence that can be found on the mechanism of the relationship between teachers' professional digital competency and self-efficacy, especially in the local context. In particular, the role of teachers' use of instructional and communication tools (TUICT) in explaining this relationship is still under-researched. As technology integration is the application of digital competence in teaching practice, understanding the mediating role of technology may help to provide a better insight into how teachers build confidence when using technology for teaching.

To address this gap, the present study examined the relationships among teachers' professional digital competence, use of instructional and communication tools, and self-efficacy among public school teachers in the DepEd Tangub City Division. Specifically, it measured TPDC, TUICT, and self-efficacy; analyzed relationships among the three variables; and examined the mediating role of TUICT between TPDC and self-efficacy. In addition, this study considers selected demographic characteristics, including age, sex, length of service, ICT training attended, internet availability, and primary device used. These factors provide important contextual information that may influence teachers' access to digital resources, opportunities for technology use, and experiences with digital learning environments. Understanding these characteristics helps situate the findings and provides a more comprehensive interpretation of teachers' digital competence, technology integration practices, and self-efficacy within the DepEd Tangub City Division.

This study offers evidence from a local context in the Philippines and assists in building the body of literature on teacher digital competence and how professional development programs can be designed to support effective technology integration and teacher confidence.

Objectives

This research is intended to determine the relationship among teachers' professional digital competence, use of instructional and communication tools, and self-efficacy among public school teachers in the DepEd Tangub City Division. Specifically, this research sought to answer the following questions:

1. What is the demographic profile of the respondents in terms of age, sex, length of service, ICT training attended in the last two years, internet availability, and primary device used?
2. What is the level of teachers' professional digital competence (TPDC), use of instructional and communication tools (TUICT), and teachers' self-efficacy (SE)?
3. Is there a significant relationship among teachers' professional digital competence (TPDC), use of instructional and communication tools (TUICT), and teachers' self-efficacy (SE)?
4. Does the use of instructional and communication tools (TUICT) significantly mediate the relationship between teachers' professional digital competence (TPDC) and self-efficacy (SE)?

Conceptual Framework

The conceptual framework of this study illustrates the relationships among the key variables: Teachers' Professional Digital Competence (TPDC), Teachers' Use of Instructional and Communication Tools (TUICT), and Self-Efficacy (SE), with TUICT acting as a mediator between TPDC and SE. The framework integrates elements of Social Cognitive Theory (SCT), Technological Pedagogical Content Knowledge (TPACK), and Technology Acceptance Model (TAM) to provide an organized view of how these factors interdepend on enhancing teaching effectiveness. Below is a simplified diagram representing the relationships among the variables:

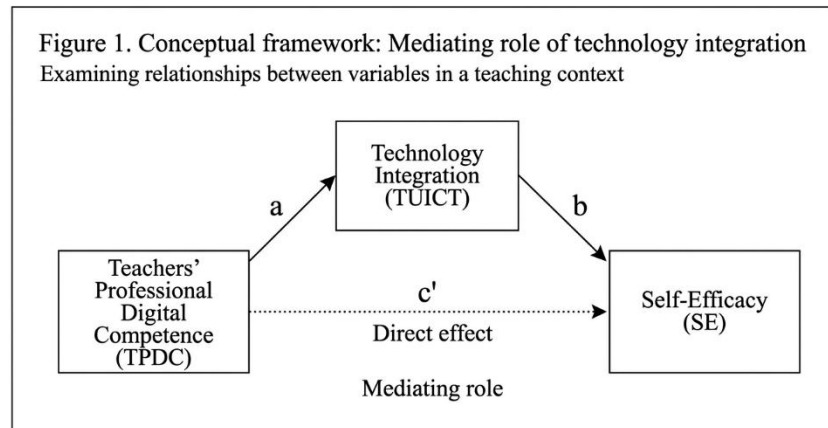


Figure 1. Schematic Diagram of the study variables.

Figure 1 presents the schematic diagram of the study variables. The theory behind the outcome variable, self-efficacy, is the Social Cognitive Theory (Bandura, 1997). People learn about their abilities through mastery experiences and successful performances in the world, says SCT. In this research, teachers who are more competent in using digital technologies are more likely to have greater confidence in their competence to effectively carry out technology-supported teaching tasks.

Teachers' professional digital competence is based on the TPACK framework by Mishra and Koehler (2006). TPACK highlights the importance of the interplay of the three knowledge domains: technological, pedagogical, and content knowledge, for effective technology integration. In this sense, TPDC is the basic knowledge and skills needed to facilitate teachers to make informed decisions about the use of digital technologies in teaching.

In this regard, the Technology Acceptance Model (Davis, 1989) will serve as a basis for discussing the mediating role of the teacher in the use of tools for teaching and communicating. According to TAM, the factors "usefulness" and "ease of use" are determinants of technology use. Instructors with a higher level of digital competence have higher scores for perceived benefits and difficulty of instructional technologies, and they report more frequent use of instructional technologies and communication tools in their instruction.

According to the mediation pathway, digital competence positively affects self-efficacy both directly and indirectly via technology integration. From an operational perspective, teachers with good levels of digital competence are more capable of choosing, adapting, and using digital tools to teach, communicate, assess, and support learners. If they are successful using these tools, they may feel more confident and may develop self-efficacy. Thus, TUICT serves as a process to provide opportunities for developing digital competence into teaching confidence.

The framework suggests direct and indirect relationships between the variables as well, but there can be other factors that affect these pathways. Teachers' access to institutional support, digital infrastructure, technical assistance, professional development, and school technology policy can ensure or restrict teachers' ability to access instructional and communication tools. These contextual factors are acknowledged as potential influences on technology integration and self-efficacy, although they are not included as variables in the present model.

Methodology

To determine the relationship among teachers' professional digital competence (TPDC), technology integration (TUICT), and self-efficacy (SE) both in the elementary and secondary levels in the DepEd Tangub City Division, this research utilized a quantitative and descriptive correlational research design. This approach was acceptable because it allowed for the assessment of the levels of the research variables, their correlations, and TUICT's mediating function in the relationship between



TPDC and self-efficacy without modifying any variables. Moreover, mediation analysis was utilized to determine whether the use of technology influences digital competence and self-efficacy.

The respondents were the public-school teachers of DepEd Tanguib City Division. Data were obtained from 217 teachers who voluntarily participated in an online survey. The respondents were selected by a convenience sampling technique due to the accessibility of respondents and the voluntary nature of participation. This sampling method was used to collect data efficiently, but it is recognized that there may have been response bias since the teachers were more willing to participate and/or more comfortable with digital technologies. Therefore, the findings should be interpreted within the context of the study sample and may not fully represent all teachers in the Division.

Research Instruments

To make sure of the validity and reliability of the instruments, a study that was validated with standardized instruments was adapted and utilized in this study. The questionnaire was composed of four parts: demographic information, teachers' digital competence, technology integration, and teachers' self-efficacy.

Teachers' professional digital competence and technology integration were measured using a validated scale developed by Aydin et al. (2024) in their study titled "Teachers' Digital Competences: A Scale Construction and Validation Study." This instrument assesses teachers' knowledge, skills, and attitudes in effectively using digital technologies in instructional and communication processes. On the other hand, teachers' self-efficacy was measured using the scale developed by Woodcock, Tournaki, and Ehrlich (2025) in their study "Teacher Self-Efficacy: Validating a New Measurement Scale to Capture the Elusive Construct," which validates strong psychometric properties.

Before data collection, the adapted questionnaire was content validated by experts in educational research and educational technology to ensure that the items were relevant, clear, and appropriate for the context of the study. The validators' recommendations were incorporated into the final version of the instrument. The adapted questionnaires were chosen according to their proven validity and reliability in prior investigations. Reliability testing for the current study produced a Cronbach's alpha coefficient of 0.70, indicating that the instrument has good internal consistency. Therefore, the instrument was considered reliable and suitable for data collection. A five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) was used for all items.

Statistical Treatment of Data

Mean and standard deviation were computed and interpreted to determine the level of the variables. Data was analyzed using Jamovi statistical software. The Shapiro–Wilk test was conducted to assess the normality of the data distribution. Since the results indicated that the data were not normally distributed, Spearman's rank correlation coefficient was employed to determine the relationships among the study variables. Mediation analysis was performed to examine the indirect effect of technology integration on the relationship between digital competence and self-efficacy.

The data shared by participants were taken care of with confidentiality.

Ethical Considerations

Participation in the study was voluntary. Before accessing the online questionnaire, respondents were provided with an informed consent statement explaining the purpose of the study, the procedures involved, the voluntary nature of participation, and their right to withdraw at any time without penalty. Submission of the completed questionnaire indicated the participant's consent to take part in the study.

To ensure confidentiality and data privacy, no personally identifiable information was collected from the respondents. Data gathered through the online survey was securely stored and was accessible only to the researchers. All information obtained was used solely for academic and research purposes, and the confidentiality of participants was strictly maintained throughout the conduct of the study.

Results and Discussion

The results and discussion present the findings of the study based on the research objectives.

1. What is the demographic profile of the respondents in terms of age, sex, length of service, ICT training in the last two years, internet availability, and primary device used?





Table 1: Demographic Profile of Respondents

	Profile	Frequency	Percent
Age	20 - 25 years old	1	0.5
	26 - 30 years old	45	20.7
	31 - 35 years old	47	21.7
	36 - 40 years old	36	16.6
	41 - 45 years old	37	17.1
	46 - 50 years old	18	8.3
	51 and above	30	13.8
Sex	Male	33	15.2
	Female	183	84.3
	Prefer not to say	1	0.5
Length of Service	1 - 5 years	73	33.6
	6 - 10 years	65	30.0
	11 - 15 years	36	16.6
	16 - 20 years	14	6.5
	21 years and above	29	13.4
ICT Trainings (last 2 years)	None	150	69.1
	1 - 2 years	52	24.0
	3 - 4 years	10	4.6
	5 or more	5	2.3
Internet Availability	Not available	2	0.9
	Rarely available	7	3.2
	Sometimes available	112	51.6
	Always available	96	44.2
Primary Device Used	Laptop	102	47.0
	Desktop Computer	1	0.5
	Smartphone	114	52.5

Table 1 presents the demographic profile of the respondents in terms of age, sex, length of service, ICT training for the last two years, internet availability, and device usage. The findings indicate that most of the respondents are young to mid-career teachers aged 26–35 years old, predominantly female, and have 1–10 years of teaching experience. Also, most respondents reported no ICT training during the past two years, while internet access was generally available “sometimes” to “always”. Smartphones emerged as the most used devices.

The results must be interpreted within the context of high smartphone dependency and low participation in the recent training on ICT. The teachers lacked formal training in ICT but had high levels of digital competence, reflecting that digital skills may be developed through self-directed learning, by using ICT in day-to-day work, by working collaboratively with colleagues, and by being constantly immersed in digital environments. In previous studies, the link between teachers' digital competences and how teachers are currently using digital tools in their professional work has also been established (Mannila et al., 2018; Skantz-Åberg et al., 2022).

Practical digital skills may also have been enhanced by the general availability of smartphones. In the home environment, teachers are now using digital technologies to communicate regularly with their students, in addition to using these technologies as instructional interface devices for accessing learning materials, creating content, and conducting classroom-related tasks (Manyeredzi & Callaghan, 2022). Mobile technologies can be more readily available than desktop computers in a learning environment and are a good tool for teachers to keep themselves up-to-date and to grow their digital skills and confidence in the learning environment.

The researchers believe that formal and informal learning experiences can be used to influence teachers' DCS based on the results they obtained. While structured ICT training is relevant, the opportunity for students to experience digital technologies in their everyday professional practice can also have a significant impact on the development of digital competence and the students' self-efficacy with the use of technology.

2. What is the level of: Teachers' professional digital competence (TPDC); Use of instructional and communication tools (TUICT); and Teachers' self-efficacy (SE)?

Table 2: Level of Teachers' Professional Digital Competence, Use of Instructional and Communication Tools, and Self-efficacy

	Mean	SD	Interpretation
TPDC	4.53	0.566	Very High
TUICT	4.16	0.614	High
SE	4.39	0.485	Very High

Table 2 presents the level of teachers' professional digital competence, use of instructional and communication tools, and self-efficacy. The findings showed that teachers demonstrated a very high level of professional digital competence ($M = 4.53$, $SD = 0.566$) and self-efficacy ($M = 4.39$, $SD = 0.485$). Meanwhile, the use of instructional and communication tools was found to be at a high level ($M = 4.16$, $SD = 0.614$). These findings indicate that teachers possess strong digital skills and confidence in their teaching performance.

The high TPDC aligns with studies showing that improved exposure to digital environments enhances teachers' competence (Redecker, 2017). Similarly, the very high self-efficacy supports Bandura's (1997) view that repeated successful experiences strengthen confidence. However, the slightly lower TUICT level proposes a gap between competence and actual application, consistent with research indicating that external factors such as training and infrastructure affect technology integration (Tondeur et al., 2023).

However, the lower level of TUICT when compared with TPDC indicates that having Digital Competence does not mean that technology is often used in the classroom, as TPDC is being used more frequently. This discovery highlights the impact of contextual and structural factors that can constrain the use of digital skills in practice. Teachers may be technologically competent, but technology can be limited in how it is used because of issues with internet connectivity, access to technologies for instruction, time demands, inadequate technical support, or problems with implementing technology at the school level.

This pattern aligns with international studies that suggest that the successful integration of technology into the classroom is not only a function of the teacher's competence, but also a function of support provided in the classroom environment (Scherer et al., 2022; Ertmer & Ottenbreit-Leftwich, 2019). It is therefore important to consider the digital competence of teachers alongside the supporting institutional systems that enable teachers to make meaningful use of digital tools within their teaching.

3. Is there a significant relationship between: Teachers' professional digital competence; Use of instructional and communication tools; and Teachers' self-efficacy?

Table 3 Significant Relationships Among Teachers' Professional Digital Competence, Use of Instructional and Communication Tools, and Self-efficacy

Variables	Correlation Coefficient (Spearman's rho)	p-value	Interpretation
TPDC and TUICT	0.742	<.001	Very Strong Positive
TPDC and SE	0.609	<.001	Strong Positive



Variables	Correlation Coefficient (Spearman's rho)	p-value	Interpretation
TUICT and SE	0.559	<.001	Moderate Positive

Table 3 presents the significant relationship between teachers' professional digital competence (TPDC), use of instructional and communication tools (TUICT), and self-efficacy (SE). A very strong positive correlation was found between TPDC and TUICT ($\rho = 0.742$, $p < .001$), indicating that teachers with higher levels of digital competence are more likely to integrate instructional technologies in their teaching practice.

This finding is consistent with the TPACK framework, which posits that teachers' technological knowledge serves as a foundation for effective technology integration in instructional settings (Mishra & Koehler, 2006). The high level of association means that teachers do seem to have a greater ability to find, adapt, and use digital tools to enhance the teaching and learning process if they are also more digitally competent. Tondeur et al. (2023) report similar results, noting that digital competence is one of the most important factors influencing meaningful technology integration in education.

The analysis also revealed a strong positive relationship between TPDC and self-efficacy ($\rho = 0.609$, $p < .001$), indicating that teachers with higher levels of digital competence tend to have greater confidence in their teaching abilities.

This result aligns with Social Cognitive Theory, which states that mastery experiences strengthen individuals' beliefs in their capabilities (Bandura, 1997). Teachers who successfully navigate digital technology may believe themselves to be more capable of addressing instructional challenges, thereby enhancing their self-efficacy. International research has found similar connections between digital competence and teacher self-efficacy, indicating that competence is an important psychological resource in technology-enhanced teaching situations (Hatlevik, 2017; Nguyen & Habók, 2024).

The moderate relationship between TUICT and self-efficacy ($\rho = 0.559$, $p < .001$) indicates that although technology use contributes to confidence, it is not the sole factor influencing self-efficacy.

There is a relatively weaker association between TUICT and self-efficacy than between TPDC and self-efficacy, which is noteworthy. This indicated that confidence might be stronger with the teacher's perceptions of competency rather than technology use itself. In the Philippine educational context, teachers often operate under varying levels of technological infrastructure, internet connectivity, and institutional support. But knowing and having the skills to use technology may add more to one's self-efficacy than the opportunity to regularly use it in the classroom.

The results of these studies suggest that digital competence serves as a facilitator for technology integration and self-efficacy. The results indicated that using technology is still an important factor, but increasing teachers' digital competence may produce other outcomes that have a snowball effect, simultaneously improving the use of technology in the classroom and boosting teachers' confidence in their professional competence. In line with recent evidence, competence-based professional development leads to more enduring gains in teaching effectiveness than technology-focused professional development (Philipp & Schüpbach, 2019).

4. Does the use of instructional and communication tools (TUICT) mediate the relationship between teachers' professional digital competence (TPDC) and self-efficacy (SE)?

Table 4 Mediation Analysis of the Effect of Teachers' Professional Digital Competence on Self-Efficacy using Instructional and Communication Tools

Mediation Analysis of the Effect of Instructional and Communication Tools						
Pathways			Label	Estimates	SE	p
TPDC	→	TUICT	A	0.754	0.0529	<.001
TUICT	→	SE	B	0.211	0.0605	<.001
TPDC	→	SE	C	0.314	0.0657	<.001
Effect Size						
Indirect (33.6)			a × b	0.159	0.0470	<.001

Pathways	Label	Estimates	SE	p
Direct (66.4)	C	0.314	0.0657	<.001
Total (100.0)	c + a × b	0.473	0.0485	<.001

Table 4 presents the mediation analysis assessing whether the use of instructional and communication tools (TUICT) mediates the relationship between teachers' professional digital competence (TPDC) and self-efficacy (SE). Results show that all pathways are statistically significant ($p < .001$). TPDC significantly predicts TUICT ($\beta = 0.754$), and TUICT significantly predicts self-efficacy ($\beta = 0.211$), suggesting that higher digital competence leads to greater use of instructional tools, which in turn enhances teachers' confidence. This finding is consistent with prior studies indicating that teachers with strong digital competencies are more likely to integrate technology effectively into instruction, thereby improving their teaching confidence and performance (Tondeur et al., 2023; Instefjord & Munthe, 2017).

The indirect effect ($\beta = 0.159$) is significant, representing that TUICT partially mediates the relationship between TPDC and self-efficacy. However, the direct effect remains stronger ($\beta = 0.314$), accounting for 66.4% of the total effect, compared to 33.6% for the indirect effect. This finding confirms partial mediation, indicating that digital competence influences self-efficacy both directly and indirectly through technology use. Similar studies have demonstrated that although technology integration contributes to teacher confidence, digital competence itself serves as the foundational factor of instructional effectiveness (Hatlevik, 2017; Scherer et al., 2022).

The direct effect is dominant, which is in line with SCT, a theory that states that self-efficacy is mainly acquired through mastery experiences and personal competence (Bandura, 1997). The confidence of teachers that they are digitally competent can be built even before they have successfully implemented technology in their classrooms. In this regard, the concept of digital competence is not just a technical capability, but also a psychological instrument that reinforces the confidence of teaching professionals in their competence.

The current results indicate that teachers in the Philippine context might be more likely to gain confidence in their teaching through competence rather than the use of technology, in contrast with international studies that focus on teachers' confidence and use of technology as the main source for gaining confidence. This is a pattern that can be related to the institutional contexts that teachers must work within, where technology infrastructure and support may be different. This can lead to a sense of preparedness and adaptability being more important than technology usage.

These findings imply that professional development programs should move beyond tool-oriented training and focus on strengthening comprehensive digital competence, including pedagogical, technological, and problem-solving capabilities. Such an approach may produce more sustainable improvements in teacher self-efficacy because it develops the foundational competencies that enable teachers to respond effectively to changing technological demands regardless of the specific tools available in their schools.

Conclusions And Implications

This study concludes that teachers in the DepEd Tanguib City Division have a very high level of professional digital competence and self-efficacy. They also show a high level of use of instructional and communication tools. This means that the teachers are generally confident in using digital skills and in performing their teaching duties. However, their use of technology in instruction is slightly lower than their digital competence and self-efficacy, which shows that having digital skills does not always mean that these skills are fully used in classroom practice.

The findings also show that teachers' digital competence, technology integration, and self-efficacy are significantly related. Teachers who are more digitally competent are more likely to use technology in teaching and are also more confident in their ability to teach effectively. This suggests that digital competence is an important factor in helping teachers become more effective and confident in their work.



The study further concludes that the use of instructional and communication tools partially mediates the relationship between digital competence and self-efficacy. This means that technology use helps strengthen teachers' confidence, but it is not the only reason why teachers feel capable in their teaching. Digital competence still has a stronger direct effect on self-efficacy. This finding shows that the core aspect of teachers' digital competence is the base for teachers' long-term confidence and effectiveness in the curriculum, and technology integration is another factor that supports teacher confidence. Thus, there is a need to maintain the theme of enhancing teachers' professional digital competency as one of the most important themes in technology-supported education.

These findings imply that schools and the DepEd Tangub City Division should continue providing relevant and practical ICT training for teachers. Professional development programs should not only address operational skills with digital tools, but also the pedagogical mentoring of professionals, collaborative lesson planning, designing technology-enhanced assessment processes, and coaching in the classroom to enable teachers to effectively utilize digital competencies in authentic teaching situations. School heads may also provide mentoring, peer sharing, and technical support so teachers can use technology more confidently and consistently.

The results also imply that improving access to stable internet, appropriate devices, and digital learning resources is important. Since technology integration depends not only on teacher skills but also on available support, schools need to create an environment where teachers can practice and apply what they know. School administrators may further support technology integration by ensuring reliable digital infrastructure, continuous technical assistance, and opportunities for professional collaboration among teachers.

Future researchers may also study other factors that can affect teachers' self-efficacy, such as school support, workload, teaching experience, training quality, and access to digital resources. Future studies may also use longitudinal research designs to see if instructors' high levels of digital competence and self-efficacy persist over time and translate into measurable increases in instructional quality and student learning outcomes.

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